Peckham (G. W.)

THE GROWTH OF CHILDREN.

BY

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(Reprint from the Sixth Annual Report of the State Board of Health of Wisconsin.)

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The investigation hereinafter reported was undertaken under the auspices of the State Board of Health; and without its generous support would have been impossible. Permission to visit the schools and make the necessary measurements was granted by the Superintendent of Public Instruction, the Hon. James MacAlister. The cards used in obtaining the data were those adopted by the Massachusetts State Board of Health, with the addition of a space for the names of the school and the grade. The following is a copy of the card issued to the various schools:

Face of Card.

Males. | FOR A SINGLE SET OF OBSERVATIONS. | *See the other side*

Record all linear measurements at nearest 1-10 of an inch; all weights at nearest 1-4 of a pound.

Name (or initials), ... Age, ... yrs, ... mos.

Height, without Shoes, ... Sitting height, ...

School, ... Grade, ... Weight, (in ordinary in-door clothes.) .....

Nationality of

Father, ... Color of Eyes, ... Color of Hair . ...

Mother, ... Birthplace, ...

Paternal Grandfather, ... Occupation (of parents if a minor),

Paternal Grandmother, ...

Maternal Grandfather, ...

Maternal Grandmother, ... Name (or initials) of observer,

(This card when filled is to be returned to G. W. Peckham, Milwaukee, Wis.) .....

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Back of Card.

The Height is to be taken in an upright position, without shoes, the feet being close to the measuring rod. If, in the case of infants, it is necessary to measure in a recumbent position, the fact should be stated.

The Sitting Height is the vertical distance between the top of the head and the surface upon which the individual is seated.

The Weight is to be taken in ordinary in-door costume, and is to be recorded at the nearest quarter pound.

The Color of the Eyes is to be recorded as blue, gray, brown, or black.

The Color of the Hair is to be recorded as fair, golden, red, brown, black, or gray. If gray, record also, if possible, the original color.

The Nationality is determined by the place of birth.

In order to facilitate the work of tabulation, the cards used in recording the observations were of different colors for males and females. The various class teachers attended to the filling out of the cards, and in most instances the weighing and measuring was done either by the principals themselves or under them by some suitable deputy; and had it not been for the hearty and intelligent interest shown by the principals and their assistants the work could not have prospered. Measuring rods built upon firm platforms, and graduated to inches and tenths, were used in taking the heights. In obtaining the weights the Fairbanks platform scales were used, and after each transfer from school to school their accuracy was tested. The nationality (i. e., place of birth) of the parents and grandparents was ascertained through the pupils; in the upper grades they supplied the necessary information themselves; the younger children were furnished with the following blank printed in both the English and the German language, and signed by the principal of the school:

Blank.

MILWAUKEE, ——, 1881.

Dear Sir:— Will you be kind enough to fill out the blank below, and return it to me.

Give birthplace of your (son or daughter).

Give birthplace of your father (state or country).

Give birthplace of your mother (state or country).

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Give birthplace of your paternal grandfather (state or country).
Give birthplace of your paternal grandmother (state or country).
Give birthplace of your maternal grandfather (state or country).
Give birthplace of your maternal grandmother (state or country).
Name (to be inserted by teacher).
Age, —— years —— months.
Give occupation of father.

Please give only the name of the state, as Vermont, Wisconsin; or the name of the country, as Ireland, Germany, etc., and not that of the city where the individual was born, in filling up the blank.

Respectfully,

—— ——, Principal.

In obtaining the nationality of the ancestors we encountered a great many difficulties. Frequently it was necessary to send the blank back to the parents day after day before the questions were all answered. In some of the lowest grades the teachers sent in addition to the blanks, notes to the parents, asking their co-operation. The great care taken in obtaining the data under these headings renders them entirely reliable. The color of the eyes and of the hair was noted by the teachers in charge of the rooms, and the results will be published later. With the exception of colored and deformed children, and also the returns from one school where the height was recorded at nearest inch, all the data collected were utilized in making up this report. Besides the public schools, the following private schools furnished important data: The Female College, President Charles Farrar; The German and English Academy, Dr. J. Keller; Markham's Academy, Prof. A. Markham; The schools for boys and girls attached to St. John's Cathedral, the Rev. James Keogh (boys), and Sister Mary (girls). To these gentlemen and their associates I am under great obligations. To many of the young gentlemen of the high school I am indebted for important aid. To the secretary of the State Board, Dr. J. T. Reeve, my thanks are also due for the kindly interest which he has shown, and for the assistance which he has given me. All the work of tabulation was performed by my wife. Besides this valuable help, the usefulness of the report is materially increased by her suggestions.

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Seven groups were formed:

I. Parents both pure American.
II. Parents both American.
III. Parents one American and one German.
IV. Parents both German.
V. Parents one or both English.
VI. Parents both Irish.
VII. Irrespective of nationality.

In the first group were included all children whose parents and paternal and maternal grandparents were born in the United States; in the second, those of American parentage, the grandparents being usually either German or Irish,— very many more German, however, than Irish. The third, fourth, fifth and sixth groups need no explanation. The seventh included the first six, beside children of Scandinavian, Icelandic, Polish, Bohemian, French, Russian, and Spanish extraction. The average heights and weights were computed by professional accountants. The reasons for preferring averages to means, in constructing the curves, will be given along with some general remarks upon the laws of growth. The results of the investigation are given in tables at the end of this report. The same results have in many instances been expressed by graphic representations. On the plates, the upper curves usually show the average heights,— the lower, the weights. The figures opposite the horizontal lines on the left, the height in inches and tenths; those on the right, the weight in pounds and tenths. The numbers below the vertical lines, the different ages. The number of observations from which the results have been computed is placed at the bottom of the plate.

GROWTH.

In order to facilitate the study of the data presented in this report with regard to the growth of children, it seems desirable to offer some general remarks upon the laws of growth, using the term growth to include only those changes in the organism that result in an increase of bulk, to the neglect of those other changes which usually occur at the same time, and which more properly be-

long to development. Writers on anthropometry have commonly studied the influence of age, sex, race, climate, occupation, and general surroundings, without sufficient regard to the physiological laws through which they act. The most important general truth for the purpose in view is that in organisms there is a universal disintegration and waste, and a concomitant reintegration, from the beginning to the end of existence. During youth the latter is in excess, and this results in growth. The increase of mase taking place at the expense of the appropriate matter surrounding the animal, would the increase be unlimited if the supply were unlimited, and the waste not correspondingly increased? But little observation is necessary to convince us that the size of any organism, and more definitely any group of organisms, is, within a certain range, limited; and that the influence which determines the amount of food that can be assimilated under the conditions supposed, is a power transmitted from parent to offspring, and known as a law of heredity, or of race or stock. Stating it broadly, we may say that the size of an organism is the result of its inherited tendency as modified by the two varying factors of waste and repair.

If we carry the analysis one step further we see that there are numerous factors which regulate the rate at which the reintegration and disintegration takes place. To the sum of these conditions the term environment is usually applied. The environment may modify the organism more at one age than at another, or one sex rather than the other; and since the nutritious matter which an animal takes in is not only the source from which the new material is obtained whereby to increase in bulk, but is also the source whence the force is derived whereby to carry on its daily work, it results that only the matter not appropriated for daily work will be left for growth. Here too the environment may act, either on the amount of food obtainable or on the cost both of acquiring and assimilating it. The general conditions of life are usually assumed to determine this relation. It is of course desirable to obtain data relative to the influence of occupation, alimentary, and hygienic conditions, and to measure definitely their power in affecting the laws of growth. Unfortunately these data are lacking in the valu-

able mass of statistics published in the country by Baxter, and also in those published by Gould. Even in the statistics of Bowditch and myself, where we know the occupation, the hygienic conditions are by no means easily determined, and at best are matters of inference.

After a very careful study of these reports it has occurred to me that by far the greater portion of an individual's surroundings are determined for him by the degree of density of population in the locality in which he lives. Hence when the density of the population is known, we obtain more information concerning the comfort or misery of existence in any place than it is possible to obtain in any other way. This is not the same as estimating the effect of urban or rural life, nor yet of the different general classes of occupation; it includes both of these, and considerably more. The density determines, in a general way, the occupations of the larger portion of the inhabitants of any district. It further modifies the condition of the atmosphere and of the soil, and the amount of obtainable food. Where the concentration of the population is excessive, the difficulties in the way of proper ventilation and sewerage are almost unmanageable. Shoemakers living in the villages throughout the state, are certainly more favorably situated than those working in the big shops of this city. Density, it would seem, is accompanied by more important modifying influences than any other obtainable fact.

I do not wish to be understood as supposing that there is a decrease of height in a district in direct proportion to the density of the population in that district, but only that, race, sex, and age, out of view, the degree of density appears to be the most important factor in determining the size of individuals. Dr. Wm. Farr has shown that the mortality of districts increases as the sixth root of their densities. The same train of circumstances that accompany, or are the effects of concentration of population, and result in an increase in the mortality, may exert as marked an influence upon the rate of growth. I hope to be able to show that the difference

between the heights of the natives of the different states as pointed out by Dr. Gould,[1] may be in part explained in this way.

Since the phenomena of growth are so complex, modifying in so many ways each other's effects, it will be necessary to consider each separately, and finally to endeavor to assign the value of each in the total result. I shall examine the facts in the following order: In relation to age, sex, race, climate, and the influence of density of population.

Since averages have been used in this report, rather than means, it seems incumbent upon me to give my reasons for departing from so well established a custom. We have here to do with the same Platonic idea that Prof. Owen has made so much of in osteology, thereby causing an amount of metaphysical theorizing that for a long time threw morphology into confusion. Quetelet adopted the Platonic notion that before man was created there must have existed in the Divine mind a model according to which the human being was formed; and further, that by eliminating the effects of accidental influences, we could discern the archetypal form. Quetelet says: "A large number of naturalists and philosophers have attempted to prove, by a course of reasoning which is more or less conclusive, *the unity of the human species.* I believe that I have succeeded in demonstrating not only that this unity exists, but that our race admits of a type, or model, the different proportions of which can be easily determined." Gould more clearly enunciates this idea in his discussion of the difference between a mean and an average. "Now," he says, "we may regard the laws of Nature, to which the Supreme Being has assigned the duty of carrying out his creative mandates, as occupying, in the almost infinitely varied circumstances under which they find application, a position analogous to that of marksmen aiming at a target. There exists, for plant, and beast, and man, a type, not necessarily clothed with a material body, yet none the less a real entity. And

[1] Investigations in the Military and Anthropological Statistics of American Soldiers. By Benjamin Apthorp Gould. New York: 1869. p. 125.

as, among hundreds of thousands of shots, no single one may centrally strike the target, while their grouping may indicate its center with a precision greater than our senses permit us to appreciate, so, by a sufficient number of measurements, under circumstances sufficiently varied, upon a sufficient number of subjects, we may arrive at a knowledge of the form and dimensions of the ideal, typical plant, or animal, or man, to which all individuals are approximations, although no one of them may ever have attained, or hoped to attain, its accurate impersonation." "Applying these principles to the present investigation, we see that there is a human type to be sought, though attainable only by the combination of results from many races; a type of race, attainable through the study of many nationalities; a type of nationality, and a type of each class within its bounds." "Thus it is that we may hope to discover the type of humanity, as well as the types of the several classes and races of men. In the present research we are dealing only with some of his external physical manifestations, but we aim at the deduction of the numerical expressions of these as a step toward constructing the typical or average man, who, though probably never clad in flesh, is yet a reality, not merely existing in the Divine mind, but capable of perception and recognition by human sense."[1]

Dr. Roberts, in his excellent manual of Anthropometry, when pointing out the importance of means, seems partly under the thrall of this idea when he says: "These regular oscillations around the same type are observable from the very instant of birth, only their limits become more confined the nearer we approach that period; as if nature, acting alone, was loth to deviate from its type, and as if the greatness of the variations arose chiefly from the modifying influence of man." "The mean height is the central or typical height which the men possess; and is the height which all of them *ought to be*, and probably would be, if their growth had not been interfered with by accidental causes.'

[1] Op. cit., pp. 244, 246.

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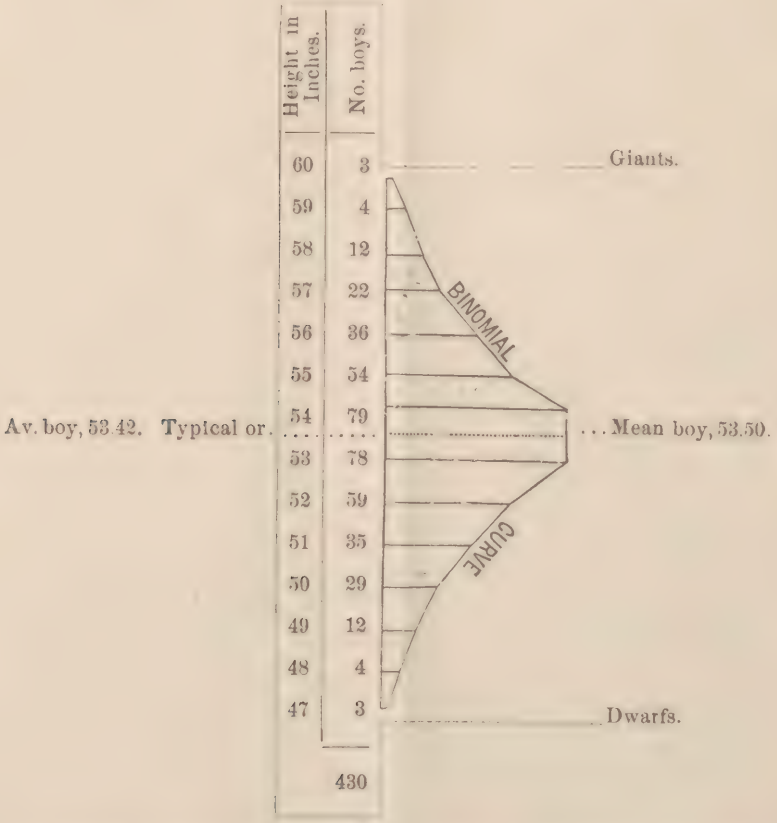
From this I should suppose Dr. Roberts to mean that the variation from the type brought about by the accidental causes produces in the lower groups men who are too short, and in the upper groups men who are too tall. This can only be true when we have in mind an ideal man. Judging in this way it must frequently happen that more than half of the individuals in a series of observations are both too tall and too heavy for the ideal notion. If we leave out of view this anthropomorphic conception, which it is possible Dr. Roberts would be willing to do, what is there in a mean that makes it superior to an average? The two forces that have resulted in the formation of the several races of men are heredity and the influence of the environment. The racial factor may be readily determined by appropriate inquiry; the influence of the external conditions remains to be determined. Suppose that we knew the race of a thousand men. They would tend to inherit a certain height. The modification of this tendency by climate, occupation, etc., might either accelerate their growth, giving a greater height than that of their ancestors, or it might result in a decrease in size. If more than half of these men happened to be more favorably situated than their fellows, the "mean man" would be tall; or it might quite as easily happen that the reverse would take place, and then he would be short. Let us take the illustration used by Dr. Roberts. The table represents the heights from actual measurement of 430 English school boys, eleven years of age.

The Growth of Children.

DIAGRAM I.

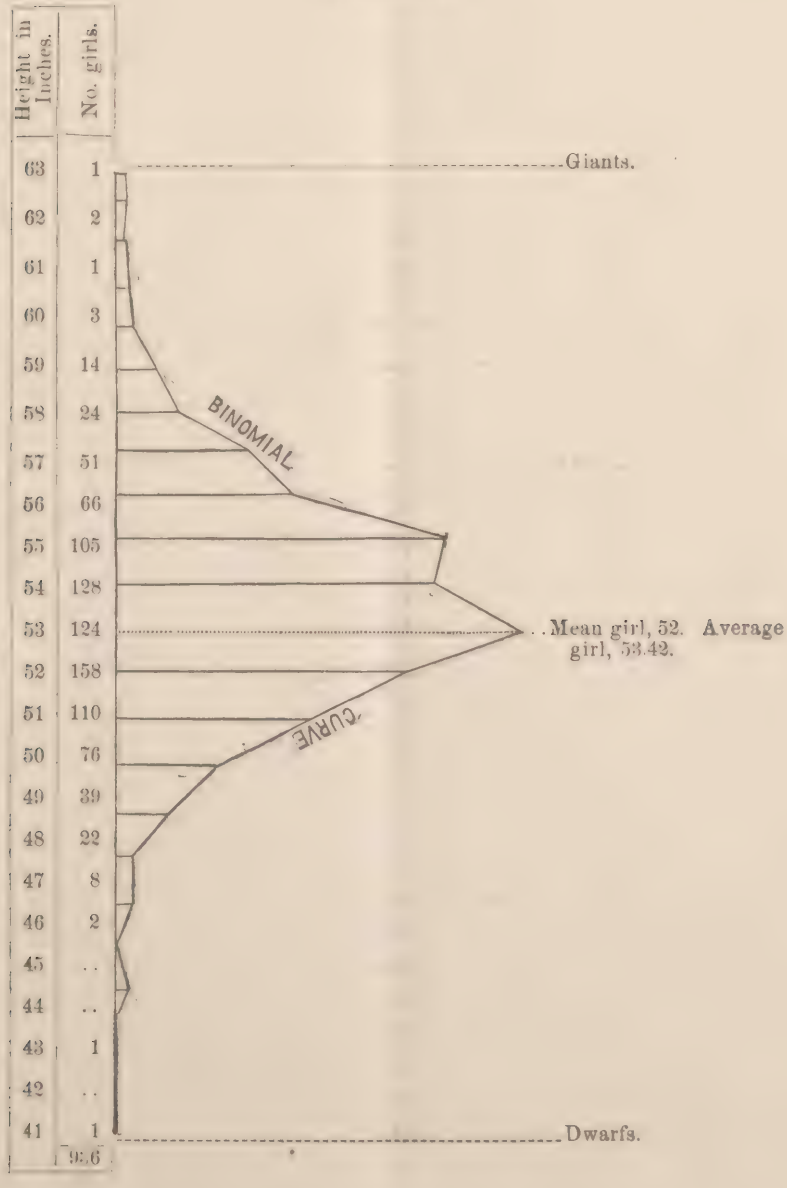


If the 79 boys, 54 inches, and the 78 boys, 53 inches high, happen to be lads from a select school, who have had better home surroundings hygienically, than the others, we should certainly get no fair idea of the height of the general run of boys in that locality, but rather the height of the 157 most happily situated.

I add, for purposes of comparison, a table representing the heights of 936 Boston school girls, eleven years of age. (Constructed from Dr. Bowditch's table.)

The Growth of Children.

DIAGRAM II.



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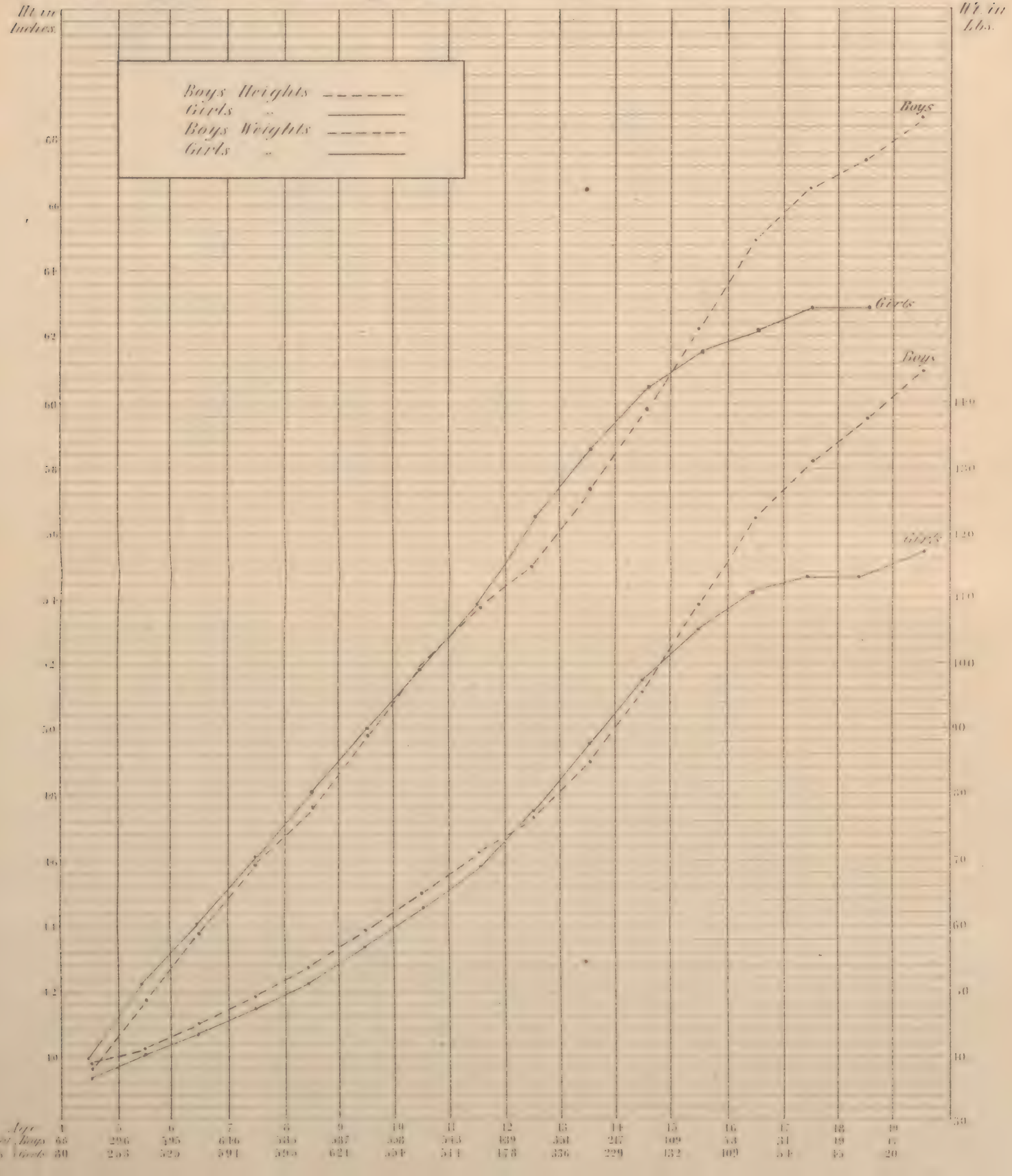
In the table constructed by Dr. Roberts the numbers arrange themselves according to a very uniform rule; but in the table that I have added the results are by no means satisfactory.[1] The mean here probably represents a group of unfortunately conditioned girls, and is in no sense median nor standard, there being 519 higher than the mean, while there are only 259 lower.[2] The average would eliminate any marked deviation favorable or unfavorable to growth, and would show how the general conditions at that time and place modified the racial tendency. "The calculation of an average from a comparatively few individuals," as suggested by Dr. Tylor, "would be worthless," but would the mean under similar conditions be more useful? What we seek, it seems to me, is the total result of the action of the environment upon the inherited tendency. Sir J. Herschel remarks that a mean involves the conception of a central magnitude and the regular march of the groups increasing to a maximum and then again diminishing.[3] "But suppose that the groups were groups of men of different occupations; then we should have either the largest group (possibly farmers), the maximum height, or the strongest group, numerically considered, might fall in the higher or lower numbers of inches. The mean would give the inherited tendency as modified by a certain kind of occupation. On the contrary the average would show the modifying

[1] Dr. Roberts, in utilizing these observations to form a table (Table No X in his Anthropometry), erroneously gives the mean as 53.50 instead of 52 inches. A reference to Diagram II shows that the greatest number of observations (158) falls at 52 inches; while he draws the mean line 53.50 between 124 and 128 observations. In several other places in this table his means are formed in an equally arbitrary manner.

[2] Dr. Bowditch remarks that in his tables the figures do not increase and diminish with the regularity which a conformity to Quetelet's law demands; but that his observations at each age are comparatively few in number, and that more numerous measurements, or a distribution of the observations in larger groups would doubtless cause the appearance of a closer agreement with the law. But when we remember that Dr. Bowditch's observations number over twenty-four thousand, the obtaining of a larger number seems almost impracticable.

[3] Edinburgh Review, No. CLXXXV, July, 1850, Vol. XCII, p. 1.

Plate I Showing rate of growth in Milwaukee school children. Whole number of observations irrespective of nationality of parents.



influence of all the occupations, and under the given circumstances the height to which any individual might attain. When the data as to race are unknown the mean would, of course, be useful. Gould shows that the height for sailors at all ages is less by more than an inch than that for soldiers.[1] If investigating the growth of men in a sea-board town where the landsmen were more numerous than the sailors, could we fairly say that all the men ought to reach the mean height — probably that of the more favored class of landsmen?

The practical advantage suggested by Dr. Roberts that means give a more uniform curve, seems to be an error. When the number of observations is large enough, the average gives the more regular curve. I add a series of means and of averages for Boston school girls of ages from five to eighteen years, to show how irregular the mean curve would be:

AGE.	5	6	7	8	9	10	11	12	13	14	15	16	17	18
No. of observations	605	[illegible]	1199	1299	1149	1089	936	935	830	675	459	353	283	155
Average height...	41.19	43.35	45.52	47.58	49.39	51 34	[illegible]	4. 55.	88 58.	16 59.	94 61.	10 61.	59 61.	92 61.95
Mean heigh:.	41	[illegible]	45	46.50	49	51	52	55.50	59	[illegible]	61	61.50	62	61.50

The conclusion of Quetelet that means render a large number of observations unnecessary, is clearly disproved by Dr. Bowditch. When the number of observations is large enough, and the material perfectly homogeneous, the difference between the mean and the average would probably be little, if any; but when, as is usually the case, the material is somewhat heterogeneous, the mean and the average may differ considerably (in the instance of 936 eleven year old Boston girls, nearly an inch and a half). The adoption of the mean height as representing the height of any number of individuals seems entirely arbitrary, and must often lead to very untrustworthy results.

[1] Op. cit., p. 132.

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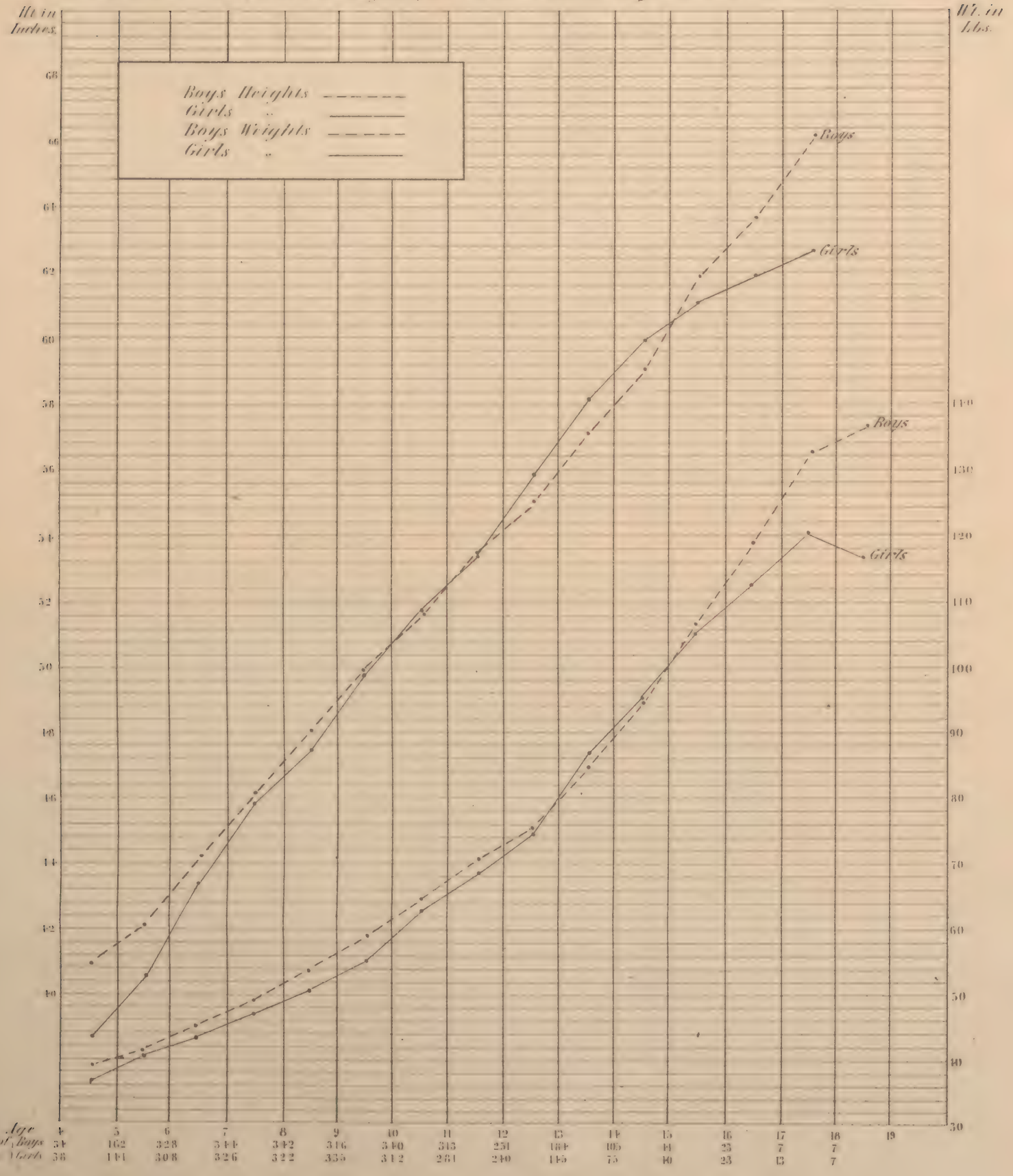
COMPARATIVE RATE OF GROWTH OF THE TWO SEXES.

Plate I shows that until about the twelfth year boys are taller than girls, and that until the thirteenth year they are heavier; after that age the girls are both taller and heavier than the boys to about the fifteenth year. The girls are therefore taller during a period of three years, while they are heavier for about two and a half years. Plate II shows the same fact with regard to children of German parentage. Here, however, the girls are heavier for a still shorter time — scarcely two years. These results agree with the curve of growth as established by Dr. H. P. Bowditch of Boston.[1] Here, the highest rate of growth occurs during the eleventh and twelfth years. Pagliani found that girls grow fastest during the twelfth and thirteenth years. "This discrepancy Pagliani explains" — as between the girls in Boston and Turin — "by a difference in the age of puberty, which he assumes to arrive earlier in Boston than in Turin."[2] I regret that I can offer no data with regard to the age of first menstruation in this city. It is highly probable that girls in this locality differ little, if any, in this respect from girls in Boston. Chadwick's table gives the average age as nearly fourteen and a half years. Dr. Bowditch's supposition that this difference in the age at which the rate of growth attains its maximum in the two sexes shows a connection of the phenomenon with the period of puberty, seems certainly established. Herbert Spencer says: "So familiar is the fact that sexual genesis does not occur early in life, and in all organisms which expend much begins only when the limit of size is nearly reached, that we do not sufficiently note its significance. It is a general physiological truth, however, that while the building up of the individual is going on rapidly, the reproductive organs remain imperfectly developed and

[1] See Report on the Growth of Children, by H. P. Bowditch, M. D. (Eighth Report of the State Board of Health of Massachusetts). This is by far the ablest contribution to this subject thus far published.

[2] Human Growth, by Chas. S. Minot, M. D., Boston Medical and Surgical Journal, July 22, 1881. In this article Dr. Minot gives a resumé of Prof. Pagliani's memoir on growth.

Plate II Showing rate of growth in Milwaukee school children of German parentage.



inactive, and that the commencement of reproduction at once indicates a declining rate of growth, and becomes a cause of arresting growth."[1]

The table of annual increase (Table No. 8) shows that the least increase, with the exception of the eighth year, occurs at the year of puberty. While the increase at seven years was 2.15 inches, and at nine years was 2.22 inches, at eight years it was only 1.66 inches. Would the eruption of the permanent incisors and the greater nervous susceptibility of girls at this age partly explain the falling off in the rate of growth? The retardation in Boston girls of this age is not clearly marked. The acceleration of the rate of growth in girls preceding puberty is just what would be expected from a study of the laws of growth. Quetelet certainly erred in considering it a "pathological result of civilization;" and since it occurs in England, Italy, Boston, and Milwaukee, it would seem to be independent of either race or climate, and to be a general sexual law of growth.

RACE, AS AFFECTING HEIGHT AND WEIGHT.

Plate III shows that Milwaukee school boys of pure American parentage, at all ages with the exception of four and six, are about half an inch taller than boys of German parentage. Plate IV, giving the curve for girls of pure American and of German parentage, gives the same result; the pure American girls, however, being taller at all ages. Plates V and VI illustrate the rate of growth in height for children of German, American and German, American, and pure American parentage. An examination of the curves will show that the German boys, at all ages excepting four, six and twelve, are the shortest. The boys of mixed American and German parentage are at nine ages taller, and at three shorter, than the Germans. The Americans (grandparents commonly German) are nearly always above the Germans, and cross the American and German line at six different places. The termination is above both of the others. The pure American, beginning at the tenth year, is,

[1] Biology, vol. II, p. 436.

on the whole, above the other three. From the sixteenth year the superiority of the American above the German, and of the pure American above both, is well marked. Plate VI shows, after the tenth year, the influence of American stock in girls. It is unfortunate that the number of observations is not greater, but all the observations we have point to the same conclusion — that there is a tendency in American children, both boys and girls, to reach a greater height than German children; and that the tendency varies as the purity of the American stock varies. The same is true of the American and German children in Boston, as is shown by Dr. Bowditch. The tables at the end of the paper show that Americans are nearly always taller than children of Irish parentage, both here and in Boston, and that the Irish, in this respect, excel the Germans.

The researches of Drs. Baxter and Gould from the seventeenth year upwards, demonstrate the superiority in height of natives of Wisconsin over natives of Germany and Ireland living in America. The data of Dr. Bowditch for Boston, extending from the fifth to the nineteenth year, and my own from the fourth to the nineteenth year, supplementing the other data, prove the greater height of Americans at all ages as compared with the Germans and the Irish; and the greater height of the Irish as compared with the Germans. Plate VII, modified from Gould's report, presents the curve for these races from the seventeenth year to the twenty-sixth. Tables 9 and 10 present these facts for Boston and Milwaukee. The influence of race upon height is, it would seem, clearly established. With regard to the influence of race upon weight, Plates III and IV, for German and pure American boys and girls, show that previous to the sixteenth year for girls, and to the seventeenth for boys, the curves cross and recross several times, the Germans having the greater weight at their termination. On the whole, the Germans also weigh more than the Irish.[1] An inspection of the tables leads to no definite conclusion as to the influence of race upon the

[1] Both Drs. Beddoe and Bowditch have noted that Germans are heavier in proportion to their height than other nationalities.

Plate III Showing rate of growth in Milwaukee school boys of American & of German parentage.

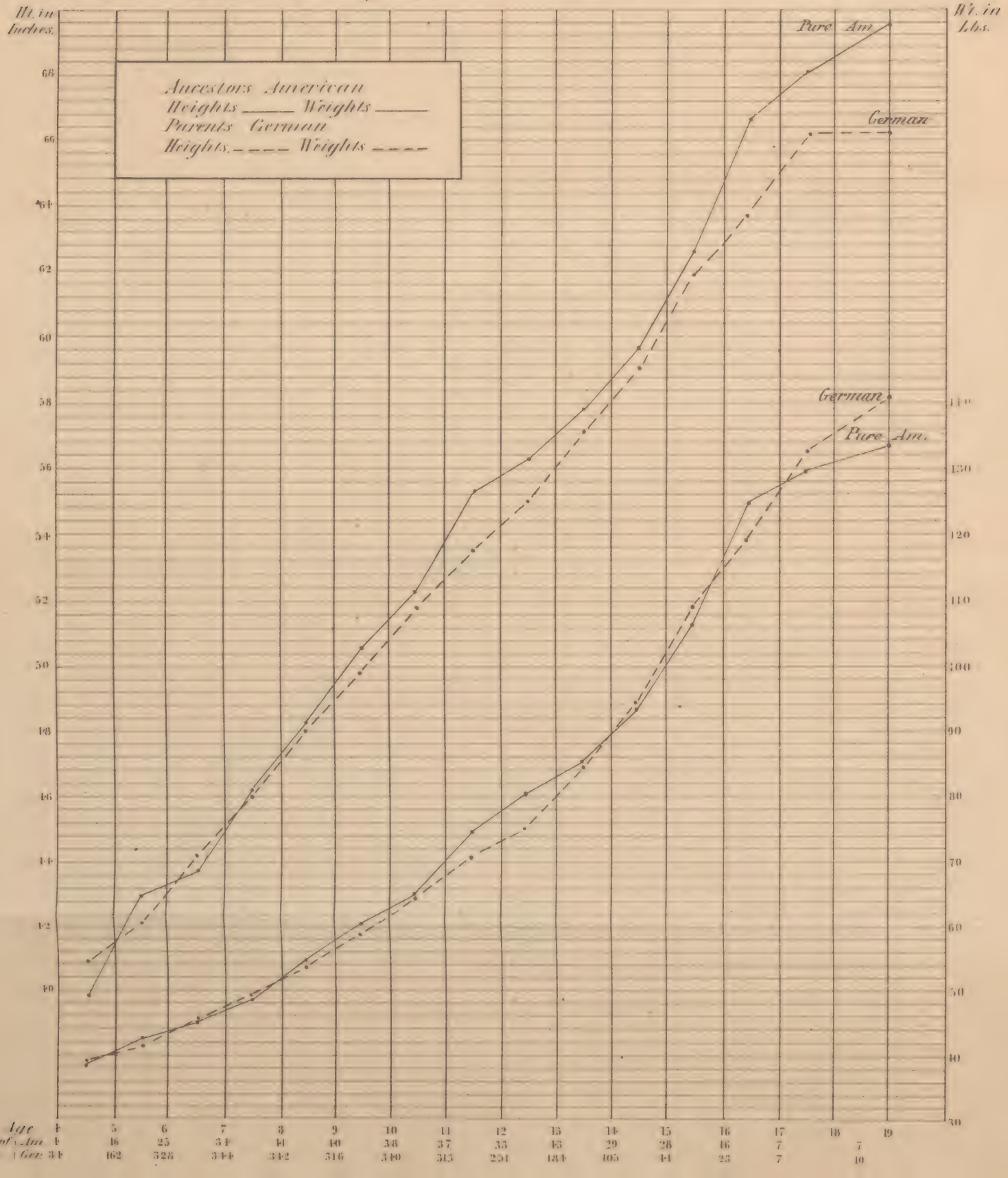


Plate IV Showing rate of growth in Milwaukee school girls of American & of German parentage.

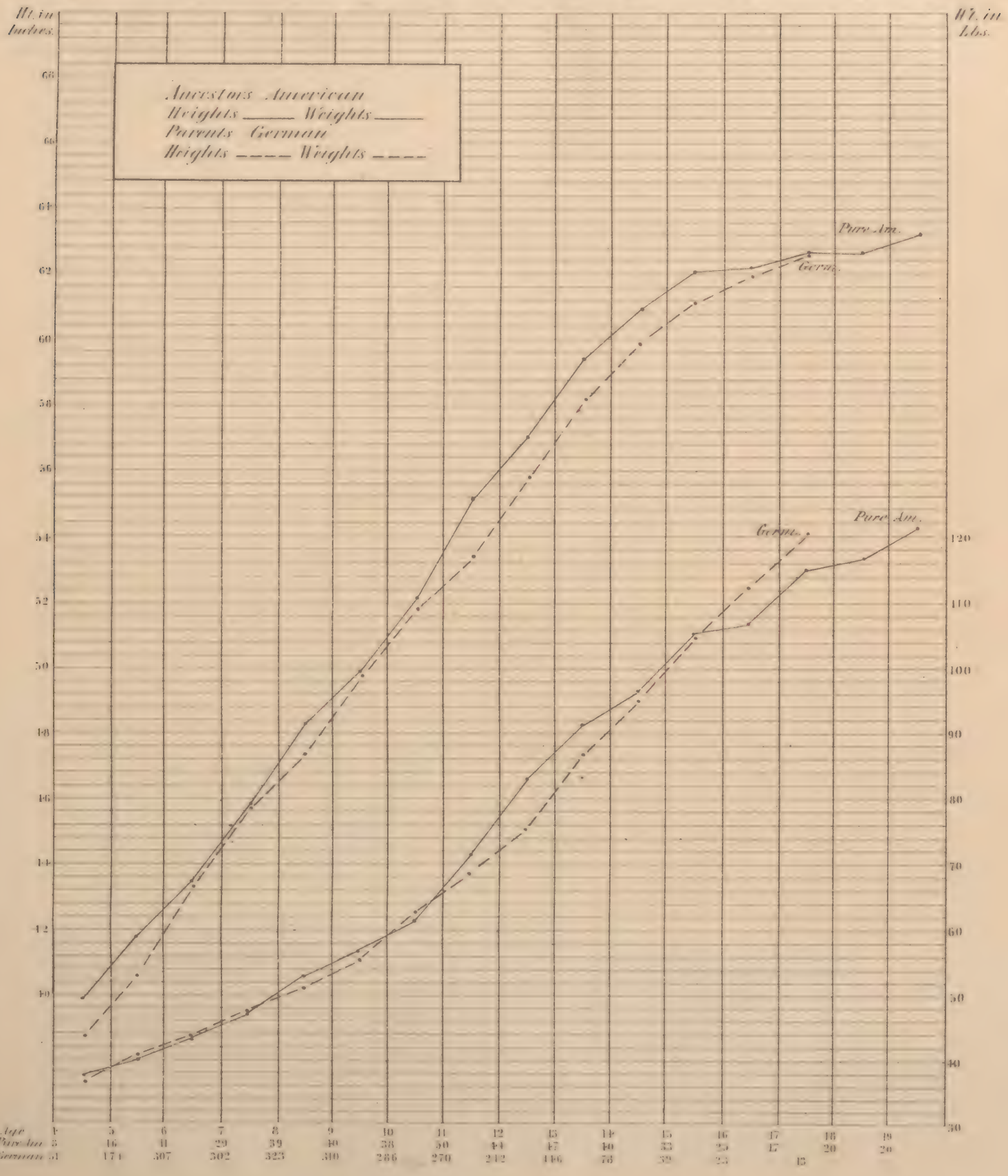


Plate I' Showing rate of growth in Milwaukee school boys of German, American & German, American & Pure American parentage.

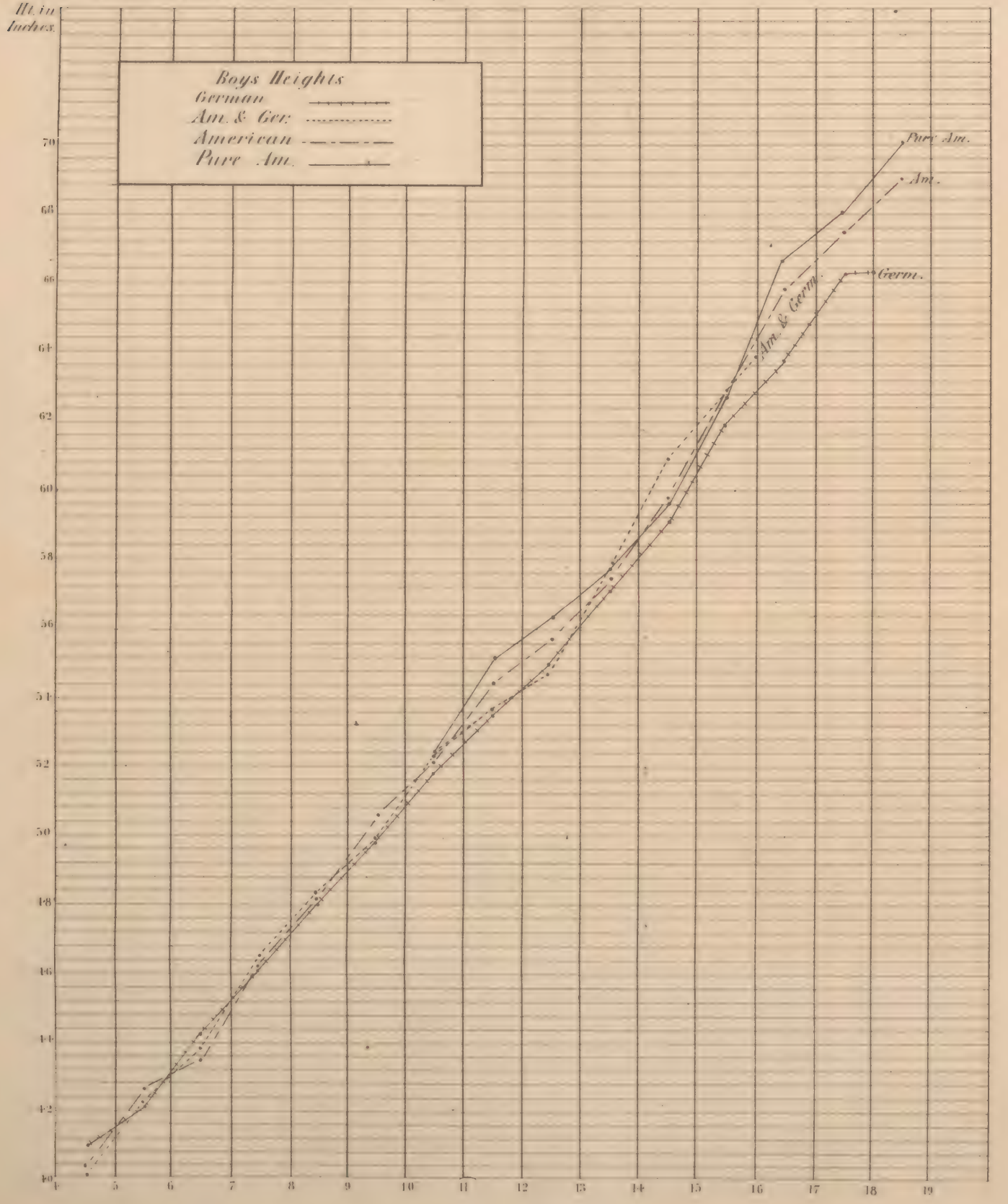


Plate VI Showing rate of growth in Milwaukee school girls of German, American & German, American & Pure American parentage.

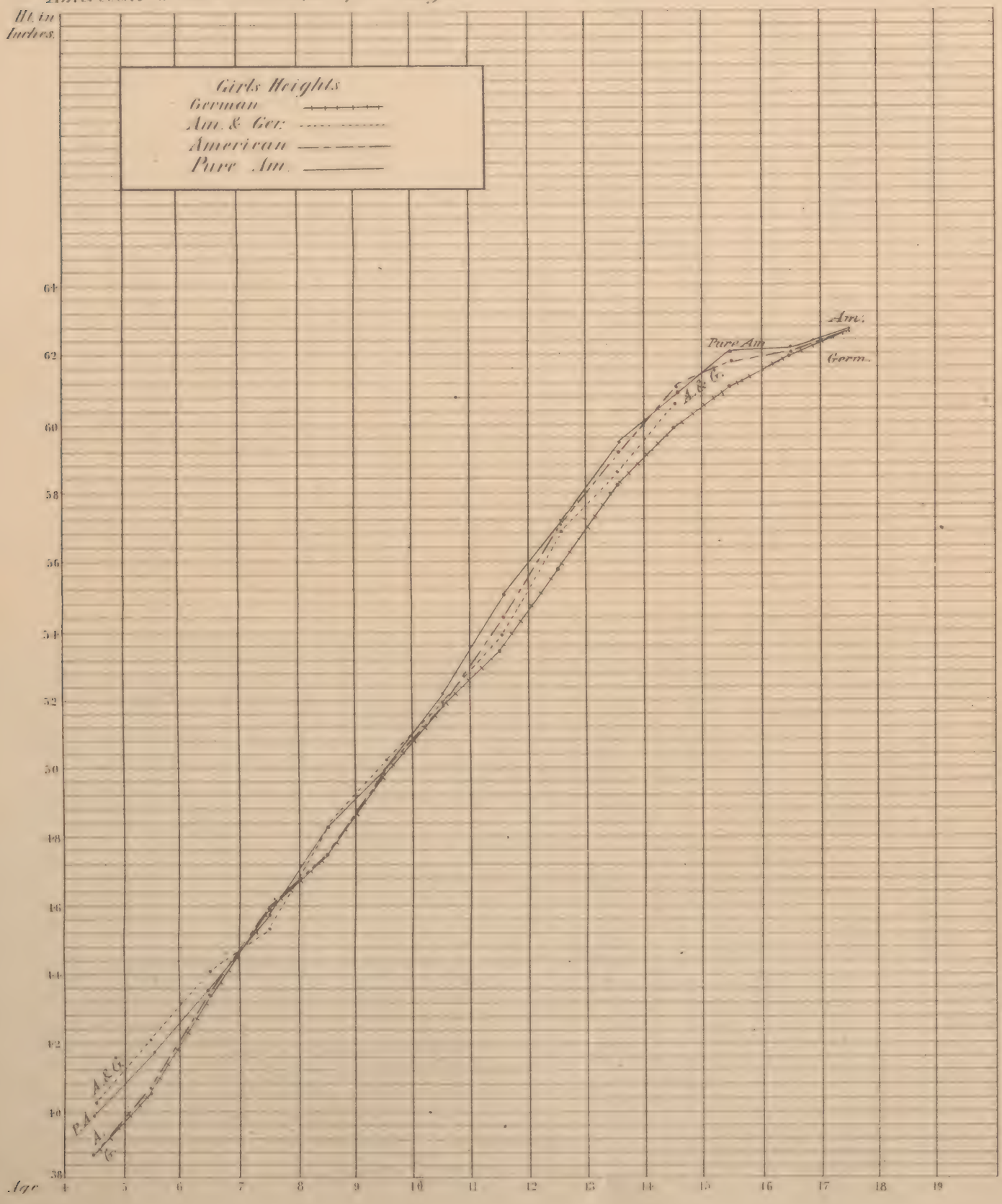


Plate VII Showing Mean heights of Soldiers in United States of America Arranged according to Nativeties (after Gould.)

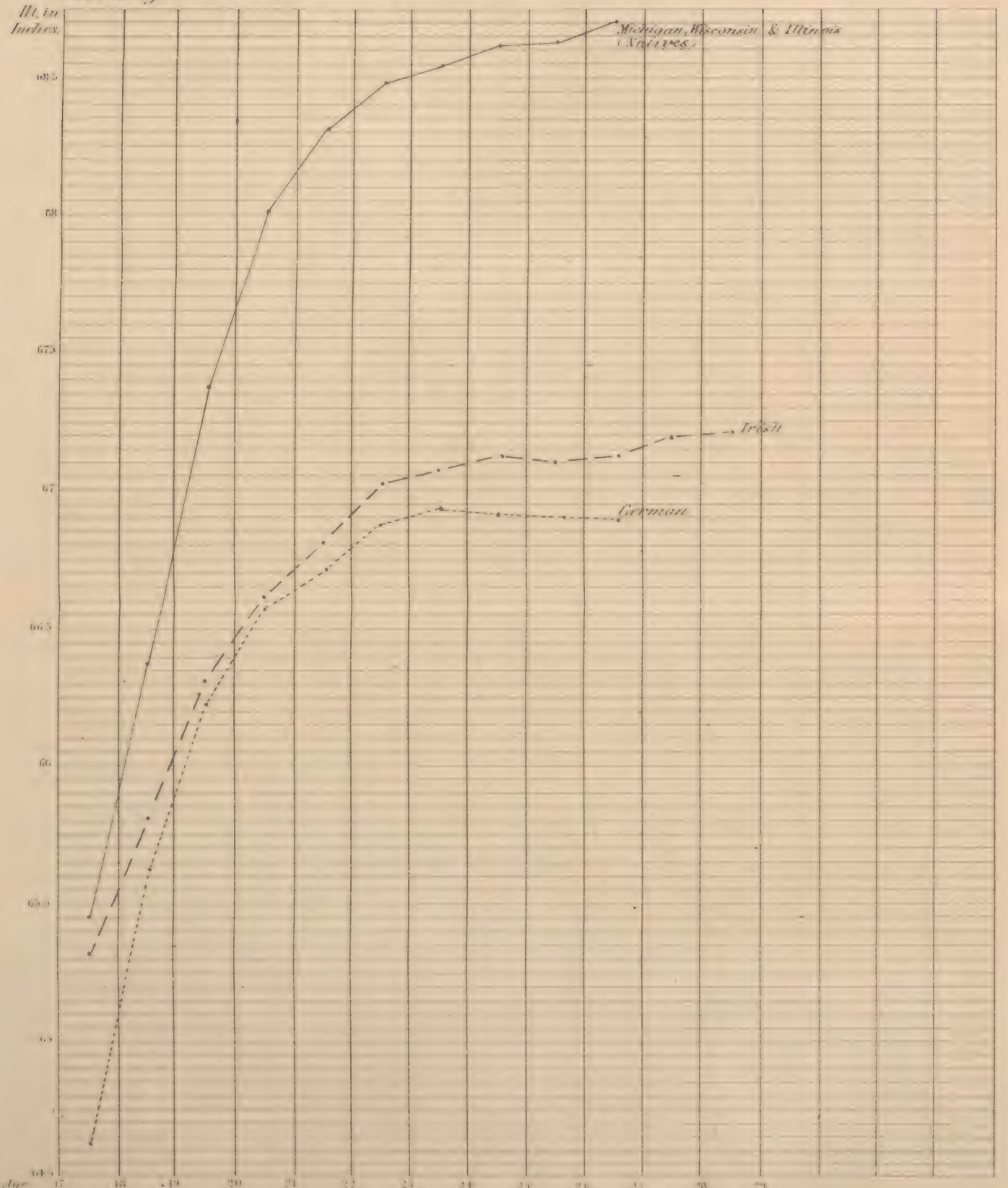


Plate VIII Showing rate of growth in school boys in Boston & in Milwaukee.
Whole number of observations irrespective of nationality of parents.

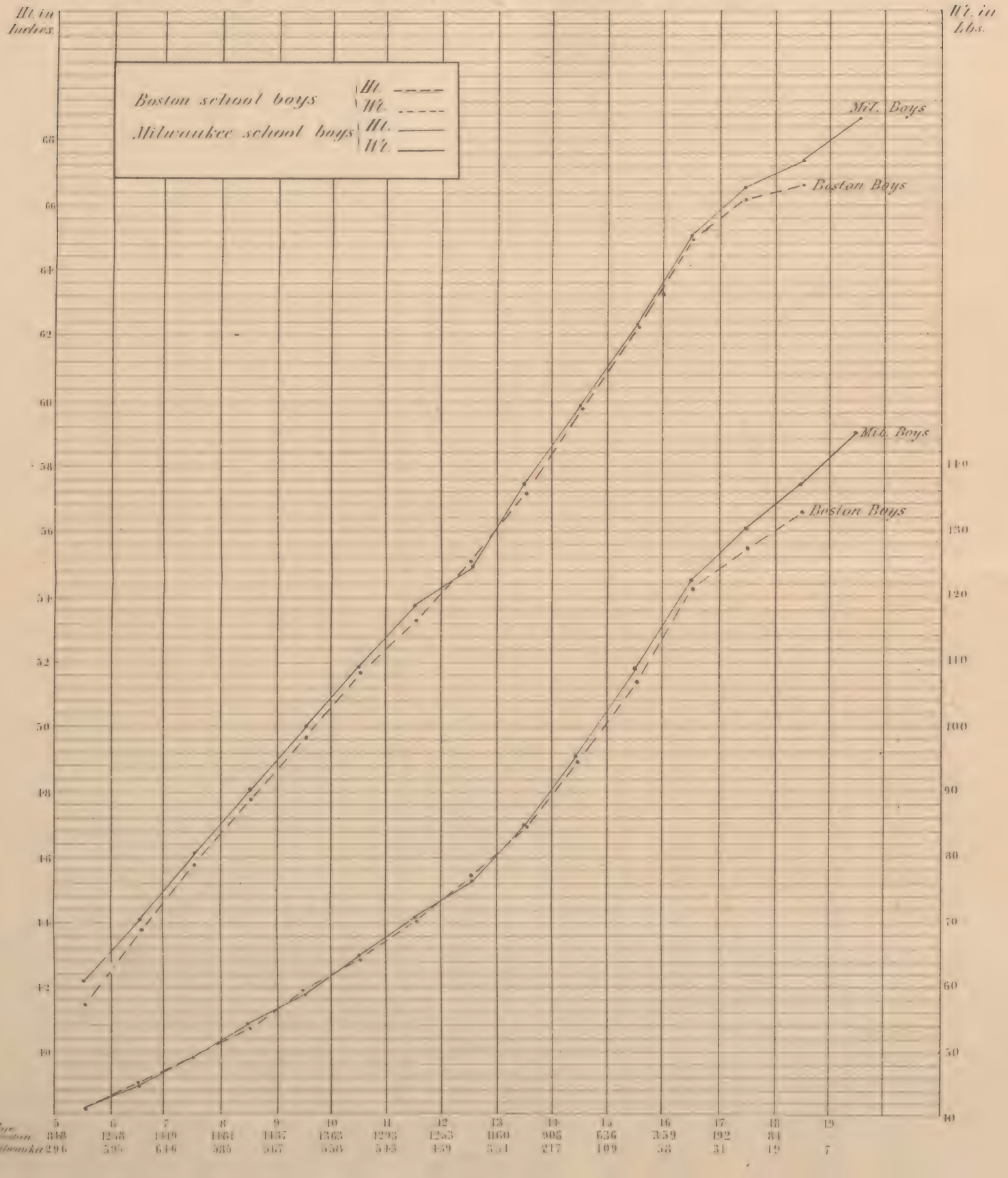


Plate IX Showing rate of growth in school girls in Boston & in Milwaukee.
Whole number of observations irrespective of nationality of parents.

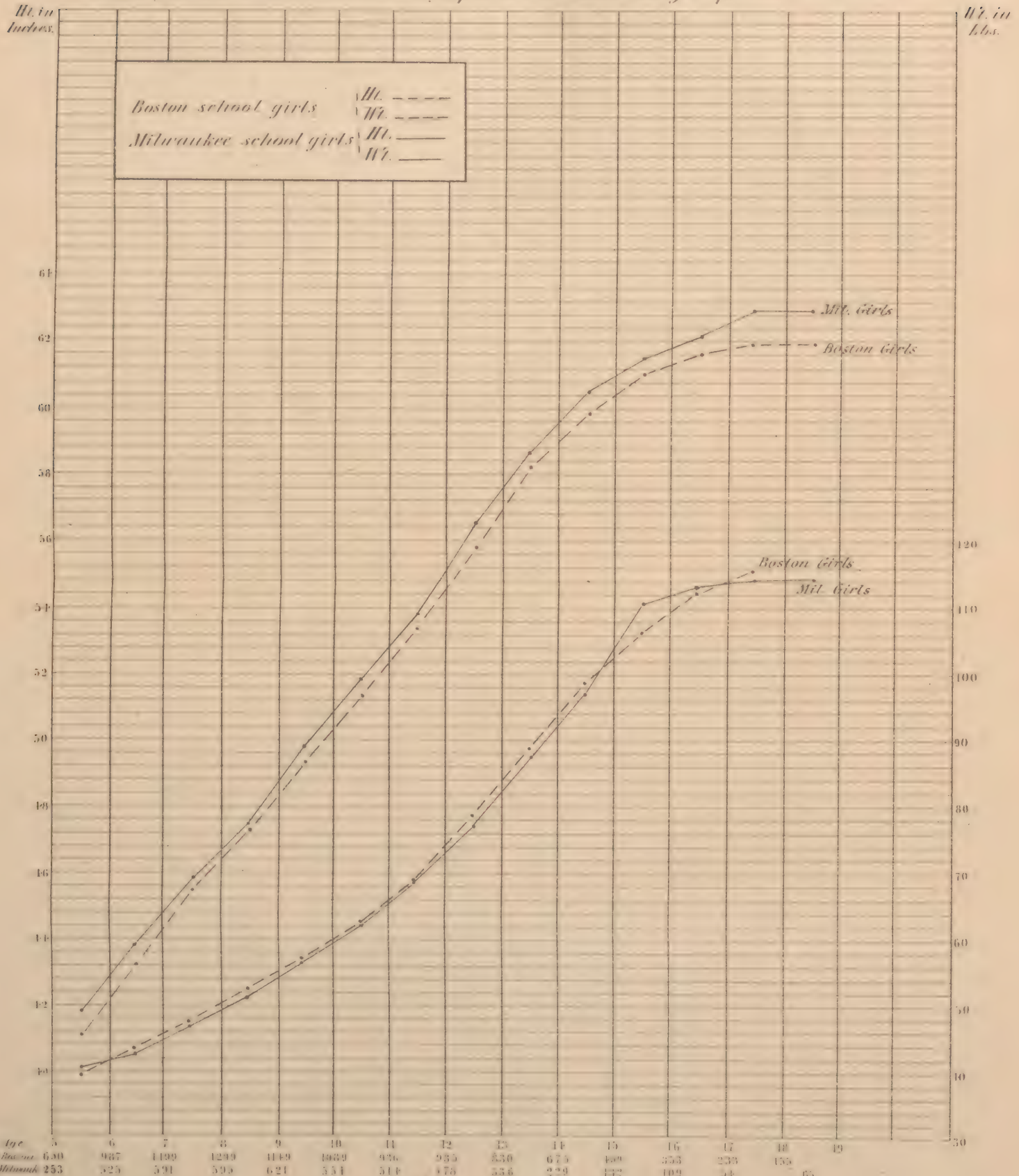


Plate X Showing rate of growth in school boys in Boston & in Milwaukee of German parentage.

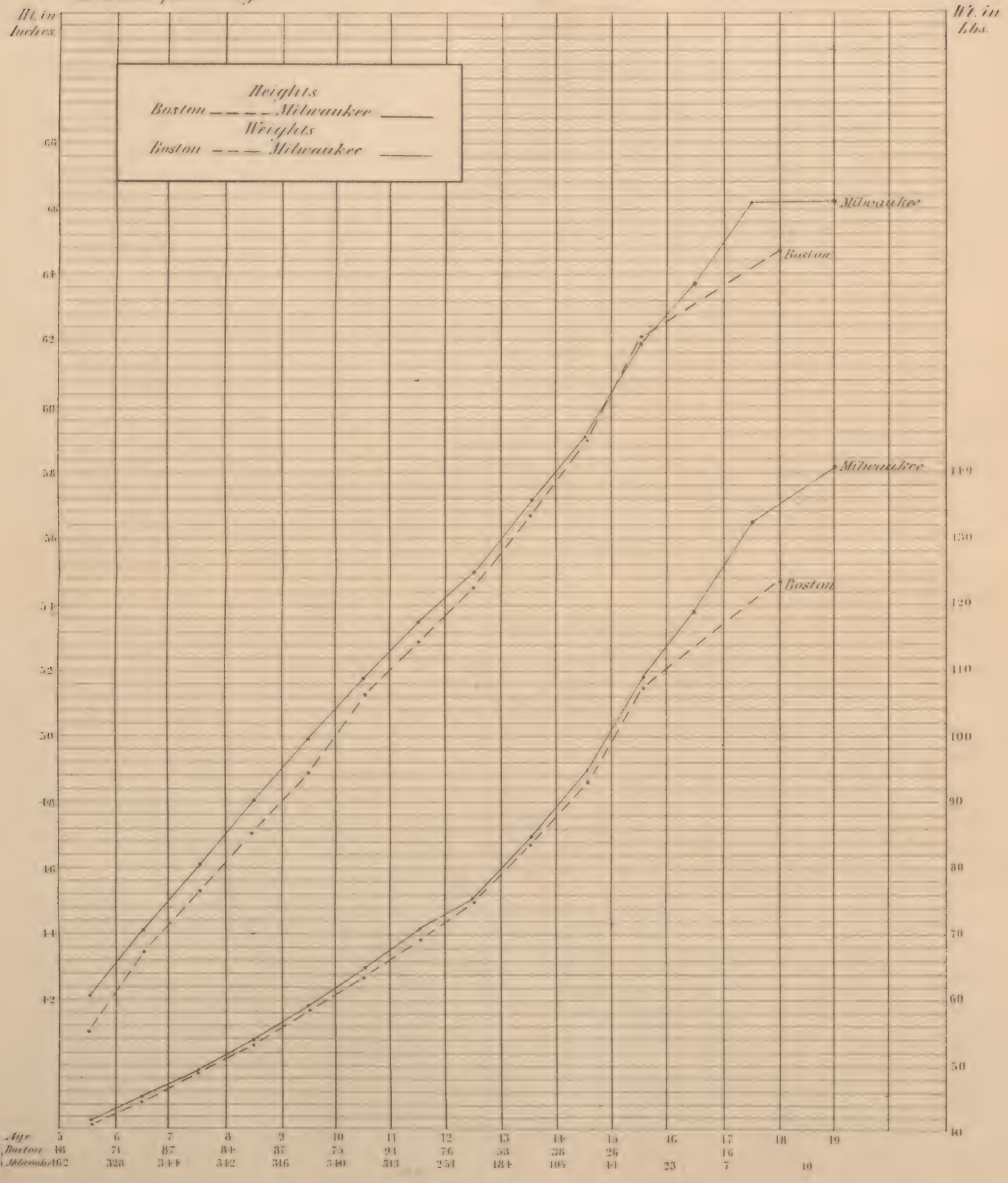


Plate XI Showing rate of growth in school girls in Boston & in Milwaukee of German parentage.

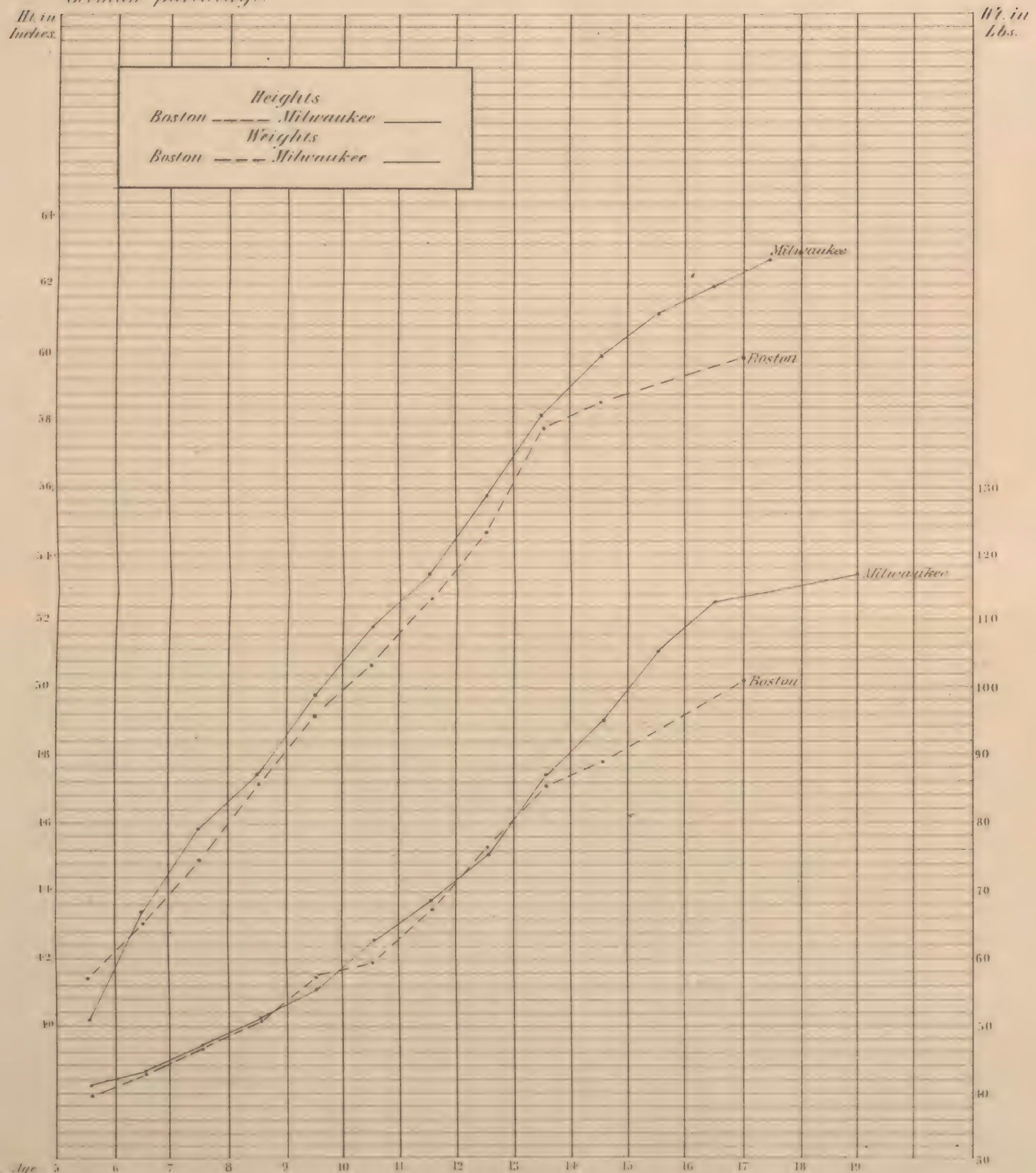
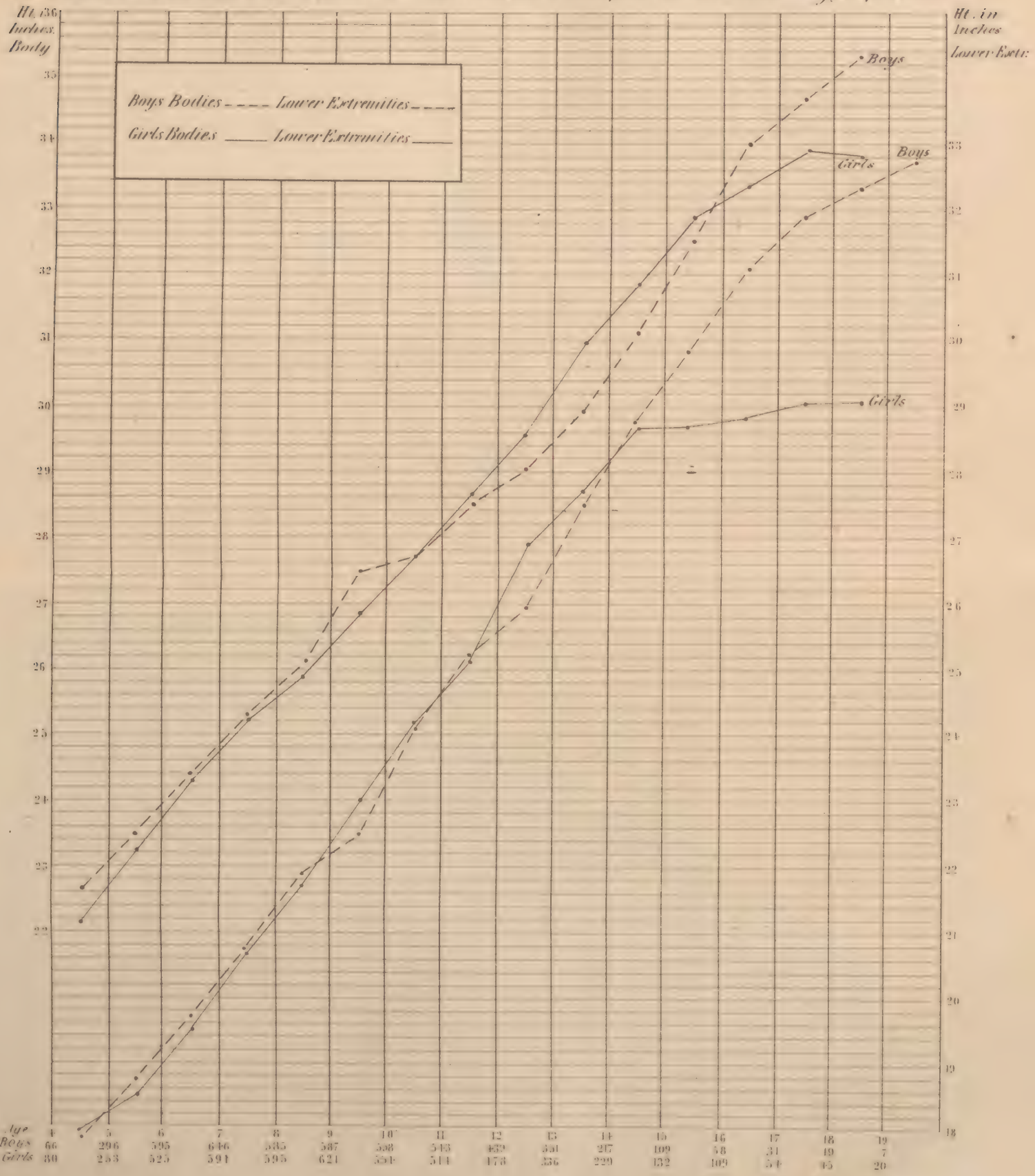


Plate XII Showing rate of growth of body and lower extremities in Milwaukee school children Whole number of observations irrespective of nationality of parents.



weight of children in this place.[1] In Boston the American boy or girl is heavier than either the German or the Irish. It may be taken, then, as fairly established that race or stock is a very important element in determining height; and further, that its influence is marked at all ages.

These observations, so far as they go, tend to the opinion that the effect of cross-breeding is that the offspring take the height of the taller parent, and is, on the whole, increase of stature. Dr. Beddoe remarks: "The results of my tables tend to support, but only in a feeble way, the current opinion as to the advantageous effect of crossing upon size.[2]

In Tables 13 and 14, showing the ratio of weight to height for Boston and Milwaukee children, the Milwaukee children in the American column are of pure American ancestry.

[1] Weight of the Body. "Its causes are various, such as hygiene, food, character of occupation, temperament and race. The probable connection between these last two makes it the more difficult to consider the question of race by itself." Anthropology, by Dr. Paul Topinard, p. 398.

[2] Stature and Bulk of Men in the British Isles, by John Beddoe, B. A., M. D., etc., London, 1870, p. 171.

TABLE NO. 9.— *Showing Comparative Rate of Growth in Height of School Boys in Boston and in Milwaukee.*

AGE AT LAST BIRTHDAY.	PARENTAGE.									
	American. Heights, inches.		German. Heights, inches.		One or both Eng'ish. Heights, inches.		Irish. Heights, inches.		Irrespective of Nationality. Heights, inches.	
	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.
Five	41.74	42.96	41.08	42.13	41.40	41.86	41.59	41.76	41.57	42.28
Six	44.10	43.75	43.50	44.20	43 64	43.92	43.74	44.80	43.75	44.08
Seven	46.21	46.18	45.25	46.06	45.60	46 06	45.61	46 76	45.74	46.09
Eight	48.16	48.32	47.13	48.01	47.50	48 52	47.72	47.75	47.76	48.05
Nine	50.09	50.64	48.85	49 86	49.39	49.83	49 53	50.21	49.69	50 00
Ten	52.21	54.37	51.21	51.78	51.62	51.89	51.57	51.72	51.68	51.85
Eleven	54.01	55.26	52.92	53.57	52.81	53 82	53.10	54.42	53.33	53.76
Twelve	55.78	56 35	54.55	54 93	54.89	55.91	54.82	55.09	55.11	54.98
Thirteen	58.17	57.79	56.70	57.19	56.76	58.59	56.70	56.44	57.21	57.47
Fourteen	61.08	59.62	59.14	59.15	59.40	60 37	58 88	59.61	59.88	59.89
Fifteen	62.96	62.66	62 06	61.96	61.48	63.81	61.15	63.18	62.30	62 34
Sixteen	65 58	66.70		63.66	63.88	67.46	64.09	63 50	65 00	65.07
Seventeen	66 29	68.01	64.75	66 25	.....	66.10	66.20	66.30	66 16	66.60
Eighteen	66.76	70.05		65.45	.....	.....		68.40	66.66	67.44

Table No. 10.—*Showing Comparative Rate of Growth in Height of School Girls in Boston and in Milwaukee.*

Age at Last Birthday.	Parentage. American. Heights, inches.		German. Heights, inches.		One or both English. Heights, inches.		Irish. Heights, inches.		Irrespective of Nationality. Heights, inches.	
	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.
Five	41.47	41.72	41.40	40.54	41.14	42.75	41.18	41.78	41.29	41.72
Six	43.66	43.51	43.09	43.42	43.32	44.72	43.29	43.99	43.35	43.78
Seven	45.94	45.76	44.91	45.86	44.81	46.06	45.45	46.53	45.52	45.93
Eight	48.07	48.36	47.15	47.39	47.63	47.25	47.39	47.46	47.58	47.59
Nine	49.61	49.87	49.20	49.76	49.37	50.37	49.27	50.86	49.37	49.81
Ten	51.78	52.08	50.76	51.84	50.98	52.65	51.20	52.13	51.34	51.89
Eleven	53.79	55.15	52.62	53.46	53.63	54.82	52.13	54.26	53.42	53.80
Twelve	57.16	57.08	54.73	55.83	55.89	56.99	55.41	56.52	55.88	56.47
Thirteen	58.75	59.46	57.82	58.22	57.71	59.50	57.64	58.99	58.16	58.68
Fourteen	60.32	60.92	58.55	59.95	60.15	60.71	59.67	60.63	59.94	60.50
Fifteen	61.39	62.01	59.81	61.15	60.93	61.54	60.47	61.81	61.10	61.59
Sixteen	61.72	62.10		61.97	62.17	62.07	61.05	62.86	61.59	62.16
Seventeen	61.99	62.65		62.75	.....	62.76	62	64.54	61.92	62.91
Eighteen	62.01	62.66	.....	.....	.....	63.08		.....	61.95	62.53

TABLE NO. 11.—*Showing Comparative Rate of Growth in Weight of School Boys in Boston and in Milwaukee.*

AGE AT LAST BIRTHDAY.	PARENTAGE.									
	American. Pounds.		German. Pounds.		One or both English. Pounds.		Irish. Pounds.		Irrespective of Nationality. Pounds.	
	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.
Five	41.20	42.30	40.57	41.55	40.07	40.97	41.33	40.86	41.09	41.09
Six	45.14	45.20	44.09	45.24	45.03	42.44	45.25	46.15	45.17	44.81
Seven	49.47	48.13	49.12	49.17	48.20	48.46	48.90	49.39	49.07	49.10
Eight	54.43	54.51	52.94	53.98	53.21	53.97	54.12	53.62	53.92	53.81
Nine	59.97	60.33	58.25	58.80	58.57	61.05	58.92	59.36	59.23	59.46
Ten	66.62	65.42	63.93	64.84	65.06	64.53	64.99	67.69	65.30	65.35
Eleven	72.39	74.28	69.69	70.81	67.11	72.29	69.60	71.50	70.18	70.92
Twelve	79.82	80.53	75.70	75.72	75.39	76.68	75.70	78.85	76.92	76.08
Thirteen	88.26	85.56	63.85	84.36	84.72	86.82	82.84	79.43	84.84	84.89
Fourteen	99.28	93.90	92.87	94.88	92.72	92.98	91.19	94.73	94.91	95.76
Fifteen	116.84	106.26	107.53	109.30	101.21	121.63	101.21	110.40	107.10	109.65
Sixteen	123.67	124.69	123.17	118.88	120.32	136.24	112.88	113.75	121.01	122.06
Seventeen	128.72	129.71		132.25	.....	139.63	127.40	134.00	127.49	130.35
Eighteen	132.71	127.25		136.46	.....	.....		.....	132.55	137.76

TABLE No. 12.—*Showing Comparative Rate of Growth in Weight of School Girls in Boston and in Milwaukee.*

AGE AT LAST BIRTHDAY.	PARENTAGE.									
	American. Pounds.		German. Pounds.		One or both English. Pounds.		Irish. Pounds.		Irrespective of Nationality. Pounds.	
	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.
Five	39 82	39 55	39.73	40.50	39.05	40.48	39 63	39.16	39.66	40.03
Six	43.81	42.45	42.68	43.23	43 26	44.99	43 21	42.88	43 23	43.12
Seven	48 02	46.74	46 26	46.94	46 26	47.05	47.64	48.39	47.46	46.97
Eight	52 93	52.81	50.69	50.83	52 45	49 81	51.80	49.69	52 04	50.87
Nine	57.52	56 35	57.37	55.52	55 96	56.67	56.76	59.94	57.07	56.44
Ten	64.09	61.70	59.83	62.82	60.98	67.68	61.59	63.13	62 35	62.45
Eleven	76.26	71.73	67.56	68.19	69.78	71.28	67.83	69.02	68.84	68 84
Twelve	81.35	82.98	76.06	75.36	77.24	79.99	76.15	78.68	78.31	77.82
Thirteen	91.18	91.62	85.82	86.64	86 38	92.08	85 76	88 56	88.65	87.96
Fourteen	100.32	96.06	88.91	95.30	98.73	96.58	96.36	96 32	98.43	97.64
Fifteen	108.42	105.90	101.16	105.66	105.53	103.60	109.46	105.09	106.08	105.87
Sixteen	112.97	107.21		112.54	111.94	104.19	108.56	119.96	112 03	110.58
Seventeen	115.84	115.06		120.40	.....	111 95	115.82	114.47	115.53	113.32
Eighteen	115 80	116.74	.....	107.88	.....	117.00		.....	115.16	112.48

TABLE No. 13.— *Showing Ratios of Weight to Height, of School Children in Boston and in Milwaukee.*

BOYS.

AGE.	PARENTAGE.									
	American. Pounds per inch.		German. Pounds per inch.		One or both English. Pounds per inch.		Irish. Pounds per inch.		Irrespective of Nationality. Pounds per inch.	
	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.
Five	.987	.984	.987	.986	.967	.978	993	.978	.988	.971
Six	1.023	1.033	1.013	1.023	1.031	.966	1.034	1.030	1.032	1.076
Seven	1.070	1.042	1.085	1.067	1.057	1.051	1.072	1.056	1.072	1 065
Eight	1.130	1.128	1.123	1.124	1.119	1.112	1.134	1.122	1.129	1.119
Nine	1.197	1.191	1.192	1.179	1.185	1.225	1.189	1.182	1.191	1.189
Ten	1.276	1.249	1.248	1.252	1.260	1.243	1.260	1.308	1.263	1.269
Eleven	1 349	1.344	1.305	1.321	1.270	1.343	1.310	1.313	1.315	1.319
Twelve	1.431	1.429	1.388	1.379	1.373	1.371	1.381	1.431	1.395	1.383
Thirteen	1.517	1.480	1.477	1.475	1.492	1.481	1.461	1.407	1.482	1.477
Fourteen	1.625	1.500	1.570	1.604	1.561	1.540	1.548	1.589	1 585	1.598
Fifteen	1.760	1.695	1.732	1.762	1.646	1 996	1.655	1.747	1.749	1.749
Sixteen	1.885	1.854		1.867	1.883	2.049	1.761	1.791	1.861	1.875
Seventeen	1.941	1.907	1.952	1.996	.....	2.131	1.924	1.870	1.927	1.957
Eighteen	1.988	1.816		2.084	.....	.....		2.211	1.988	2.042

Table No. 11.—*Showing Ratios of Weight to Height of School Children in Boston and in Milwaukee.*

GIRLS.

Age.	Parentage. American. Pounds per inch.		German. Pounds per inch.		One or both English. Pounds per inch.		Irish. Pounds per inch.		Irrespective of Nationality. Pounds per inch.	
	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.	Boston.	Milwaukee.
Five	.960	.947	.959	.999	.947	.946	.962	.937	.965	.959
Six	1.003	.975	.990	.995	.998	1.206	.998	.974	.998	.987
Seven	1.045	1.021	1.030	1.023	1.032	1.021	1.048	1.039	1.042	1.026
Eight	1.101	1.091	1.073	1.072	1.101	1.054	1.093	1.055	1.093	1.068
Nine	1.159	1.129	1.166	1.115	1.133	1.125	1.152	1.178	1.156	1.133
Ten	1.237	1.184	1.178	1.211	1.197	1.285	1.203	1.241	1.214	1.203
Eleven	1.306	1.300	1.284	1.273	1.301	1.300	1.276	1.273	1.288	1.279
Twelve	1.423	1.453	1.393	1.354	1.382	1.403	1.374	1.392	1.401	1.378
Thirteen	1.552	1.540	1 484	1.488	1.497	1.547	1.487	1.501	1.524	1.498
Fourteen	1.663	1.576	1.518	1.590	1.641	1.590	1.614	1.593	1.612	1.613
Fifteen	1.766	1.707	1.691	1.727	1.732	1.683	1.661	1.700	1.736	1.718
Sixteen	1.830	1.726		1.816	1.800	1.678	1.758	1.949	1.819	1.778
Seventeen	1.869	1.836		1.918	.....	1.783	1.870	1.773	1.865	1.801
Eighteen	1.867	1.863	.....	.....	.....	1.854		.....	1.859	1.798

The Growth of Children.

CLIMATE, AS AFFECTING HEIGHT AND WEIGHT.

That climate has any considerable effect in modifying growth, in face of the facts seems quite improbable. Theoretically, a low temperature ought to stunt men, since a large amount of energy would be expended in maintaining the bodily heat; and the further strain upon the digestive system to provide the large quantity of food necessary for this purpose would leave a smaller surplus for growth. The evidence, however, so far as we can disentangle it, does not justify this inference. Taking a wide survey of the facts, we find that the Western Esquimaux, the Negroes of Guinea, the Australians, the Patagonians, and the Kaffirs, all have an average height of over 170 metres. In Europe the non-dependence of stature upon latitude is patent. For South America, D'Orbigny discarded this theory most emphatically.[1] Dr. Baxter's table showing order of superiority in stature, by states, of American-born white men is a remarkable series of observations for refuting the supposition.[2] The evidence is more conclusive when we tabulate the statures according to the congressional districts in the different states, and eliminate the racial element: since the climatic difference between one congressional district and another in the same state is insignificant, and yet there is a good deal of variation in the stature. The same is true, in many cases, when the states are compared with each other. The table below shows the non-dependence of the stature on temperature, altitude or any of the elements of climate. Vermont, New Hampshire and Maine have almost identical climatic conditions, and have a population exceedingly homogeneous: the Germans are entirely absent, and the Irish are evenly divided among the three states; and yet we find a difference of over one inch between Maine and New Hampshire, while Vermont and New Hampshire differ by more than half an inch.

"The idea that climate, *per se*, has any influence upon stature, is very little supported by our materials. At the first blush, we

[1] Gould, Op. cit. p. 131.

[2] Statistics, Medical and Anthropological. By J. H. Baxter, A. M., M. D. Washington, 1875, p. 24.

might be disposed to think that a northern position, and a somewhat rigorous climate, operated favorably, probably by natural selection. But Cornwall furnishes a counter exception too conspicuous to be disregarded. And the climate of Upper Galloway, where the tallest men are found, is, compared with that of Scotland in general, rather mild than severe. Kerry, again, has the mildest climate in Ireland, but its people are physically superior to those of Connaught, the climate of which differs in no wise from that of Kerry, except in being rather colder and less genial. Climate, where it does influence the breed of men, probably does so either through natural selection, or by affecting his food and mode of life."[1] (Dr. Beddoe.)

TABLE *Showing Order of Superiority in Stature, by States, of* 315,620 *American-born White Men.*

Order of superiority.	State.	Number of men examined.	Mean height, inches.	Order of superiority.	State.	Number of men examined.	Mean height, inches.
1	Kentucky	4,252	68.67	14	Maryland	6,918	67.81
2	Kansas.....	729	68.55	15	Ohio.....	39,311	67.78
3	Minnesota....	3,682	68.37	16	Vermont	3,374	67.58
4	Missouri	6,031	68.33	17	Delaware.....	1,215	67.49
5	California.....	1,308	68.30	18	Pennsylvania..	47,124	67.47
6	Nevada	21	68.28	19	Dist. Columbia.	2,883	67.35
7	Indiana	38,354	68.08	20	Rhode Island..	3,013	67.29
8	West Virginia.	5,187	68.00	21	New York	43,798	67.27
9	Wisconsin.....	10,922	67.91	22	New Jersey ...	17,084	67.02
10	Maine.....	12,363	67.89	23	N. Hampshire.	2,801	66.92
11	Iowa	7,823	67.89	24	Massachusetts .	6,280	66.89
12	Illinois	36,465	67.83	25	Connecticut ...	2,099	66.58
13	Michigan	12,583	67.82				
	Total and mean of total					315,620	67.67

Dr. Baxter, in discussing this table, and the peculiarity that the height of foreigners is greater in every instance than the mean height ascribed to the nation represented, is inclined to attribute the difference in height to a difference in the age of the

[1] Op. cit. p. 173.

men examined. Dr. Gould has shown that after taking age, etc., into consideration, the difference still exists. He has also shown that emigrants from the eastern to the western states are taller than the natives remaining at home.

An inspection of Plates VIII and IX shows the marked superiority in height of the Milwaukee boy and girl, irrespective of the nationality of the parents, over the Boston boy and girl. The boys are taller at all ages except the twelfth year, and the girls at all ages. The difference between the boys is not so marked as it is in the case of the girls. The Milwaukee girl is nearly one-half inch taller at all ages; increasing at the seventeenth and eighteenth years to a whole inch. The boys from four to twelve are about one quarter of an inch the taller. From twelve to sixteen the difference falls to less than a tenth; and then again increases, and at eighteen is three-quarters of an inch. My tables thus demonstrate the superiority in height of the western boy and girl over their Boston cousins. Plates X and XI present the same facts for children of German parentage; the Milwaukee German exceeding the Boston German to a still greater degree. Tables 9 and 10 show for Americans in Boston and in this city a less marked difference. For boys from eight to thirteen the Milwaukee Americans are above; from thirteen to fifteen the Boston Americans have the advantage At sixteen years the Milwaukee boys are an inch the taller, and at seventeen and eighteen years, more than an inch and a half. The American girls here are taller at all ages than in Boston, excepting the sixth, seventh and twelfth years. After the fourteenth year they are about one-half inch taller. The same tables present generally similar facts for children of the Irish and the one or both English groups.

The curves of weight for the totals of Milwaukee and Boston boys from five to thirteen, nearly agree. After this age the Milwaukee lads average from two to four pounds heavier than those in Boston. The Boston girl is from one and a half to two pounds heavier at all ages except five, fifteen and sixteen. Among the Germans, both boys and girls have a greater weight in this place than in Boston. The pure American boy here is heavier at nine

ages and lighter at five ages than the Boston boy; while the girls are lighter at nine ages and heavier at five — exactly the reverse of the boys. The Irish of both sexes are generally heavier in Milwaukee than in Boston, and the same is true for the groups one or both English, with more exceptions in the case of the English girls.

Inasmuch as these children are arranged in similar racial groups, and are of the same ages, the media — including occupation — must be the causes of this difference. Occupation I think we may fairly leave out of view, since the occupations of the parents of the children here and in Boston cannot be very different. I think that this is true not only of the children as a whole, but that it holds within the different groups. If the occupation indicates, as far as is possible, the degree of comfort or misery in which the children live, we shall have to fall back upon climate or upon my proposed explanation, the density of population as modifying the dimensions of both children and adults. Dr. Gould's statement that there is a something in the western as compared with the eastern states that produces greater height, is strikingly confirmed, so far as Boston and Milwaukee children are concerned, by these investigations. To return to the problem of the effect of climate. A study of the state of Kentucky reveals the fact that congressional districts Nos. 1, 3, 4 and 7, having headquarters at Paducah, Bowling Green, Lebanon and Lexington, respectively, with little or no climatic difference, and an American population, differ by more than an inch among the several districts. On the other hand, in Lebanon, Ky., latitude 37°, and Bangor, Me., latitude 45°, the average stature differs by only nine one-hundredths of an inch, with the population fairly conformable. Walker's Atlas[1] and Baxter's Report[2] studied together give abundant proof of the non-dependence of stature on climate. The population of the United States is so exceedingly complex, so many different nationalities entering into its composition, that all statements must be made in a general

[1] Statistical Atlas of the United States, by F. A. Walker, Washington, 1874. Plates of Physical Features of the United States.

[2] Op. cit. vol. II, pp. 24, 25, 507, 510.

manner. With this qualification I will proceed to the discussion of density of population as modifying the dimensions of man.

DENSITY OF POPULATION, AS AFFECTING GROWTH.

In my preliminary remarks with regard to the importance of this element, it was noted that its action is marked in two directions: it modifies, first, the hygienic conditions of the whole population, controlling the influence of occupation; second, the intensity and character of the struggle for existence.

The numbers which represent the average density of population in any state, only afford useful indications inasmuch as the population within the described state is very unevenly divided among the different portions of the state. In studying the distribution of the population, I have used Walker's charts for the year 1860, and also his plates of foreign population.[1] Walker forms five groups of density of population: I. 2-6; II. 6-18; III. 18-45; IV. 45-90; V. 90+, to the square mile. These groups are, broadly speaking, also groups of occupation, especially the first three. Walker shows that in this country agricultural pursuits will support a population not greater than 45 persons to the square mile. A greater number per square mile indicates the presence of manufacturing and commercial interests. The cities would be formed of many groups of both in-door and out door occupations.

Dr. Baxter's statistics were all obtained by congressional districts, and the number of men from the different districts within the states differed very considerably. In estimating the effects of concentration of population this is a very important element. The eastern portion of a state might have a density of 100 per square mile; the western not more than 20 per square mile. If 4,000 men were enlisted in the state — 3,000 from the densely settled portion and 1,000 from the sparsely settled, the average stature for the whole would give results, for the purposes in view, almost worthless. In order to facilitate the study of the effects of density of population, I have tabulated the states[2] according to order of

[1] Op. cit.

[2] Nevada and the District of Columbia are omitted: the former because the number of observations is too small (only 21); the second on account of the mixed and unstable character of its population.

superiority of stature; according to the number of persons to the square mile; and according to average height. An inspection of the table shows that the first twelve states belong to the first three groups of concentration (2–45 per square mile). Leaving Vermont and New Hampshire out of view, the remaining nine states arrange themselves very regularly. Note that Ohio actually is No. 14, while by density it is No. 16; Delaware, No. 16, by density is No. 15; Pennsylvania, No. 17, by density is No. 18; and so on. Maryland, which was No. 13, is moved to No. 17. This partly results from the fact that Vermont is moved to the first column. Vermont and New Hampshire, having but 30 and 35 persons to the square mile, have relatively low statures, and would seem to be at variance with this generalization. Both are long settled states, and that in them the struggle for existence is extremely severe, and has modified the effect of density, is probable for several reasons. New Hampshire, in the years between 1860 and 1870, actually decreased in the number of its population. Vermont in the same period has gained only 2 persons per square mile. Massachusetts increased from 157 to 186 per square mile. Both Vermont and Massachusetts have a general average of 18–45 per square mile, showing agricultural pursuits. In 1870 the states having this average returned an agricultural product worth over $4,500 per square mile. In New Hampshire the total for the state was worth only $2,500–3,000 per square mile; and in Vermont, about $2,800–3,800. That is to say, the conditions of life in these two states are such that even this small population taxes the productive capacity of the soil very severely. This state of things must lead many able and vigorous young men to move west, to more fertile farms. The density considered in relation to the character of the environment, would, I think, lead us to expect that their position as regards stature would be low in the order. In the first column the transposition of Kentucky from the first to the tenth place is in part explainable by the very large proportion (three quarters) of the total number of men having enlisted from the less densely populated portions of the state; and the further fact that the American element is exceedingly large. Other seeming discrepancies could

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be explained, but lack of space forbids. I add a list of the statures in the different states, and also of the statures of portions of each state to show that where there is much concentration the stature is lowered by the density.

TABLE *Showing Number of Persons per Square Mile, Average Height, Order of Superiority by Stature, and Order of Superiority by Density of Population of the Different States.*

STATES.	No. of persons per square mile.	Average height.	Order of superiority by stature.	Order of superiority by density of population.
Kentucky	30	68.67	1	10
Kansas	2	68.55	2	1
Minnesota	2.10	68.37	3	3
Missouri	18	68.33	4	8
California	2	68.30	5	2
Indiana	39	68.08	6	12
West Virginia	19	68.00	7	9
Wisconsin	14	67.91	8	6
Maine	17	67.89	9	7
Iowa	12	67.89	10	4
Illinois	30	67.83	11	11
Michigan	13	67.82	12	5
Vermont	30	67.53	15	13
New Hampshire	35	66.92	21	14
Maryland	61	67.81	13	17
Ohio	58	67.78	14	16
Delaware	52	67.49	16	15
Pennsylvania	63	67.47	17	18
Rhode Island	133	67.29	18	22
New York	82	67.27	19	20
New Jersey	80	67.02	20	19
Massachusetts	157	66.89	22	23
Connecticut	96	66.58	23	21

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STATE.	Order of superiority.	Congressional district.	Average height.	Number of men examined.	REMARKS.
Kentucky	1	1	69.47	490	
	9	5	67.84	398	Includes city of Louisville.
Missouri	1	4	70.08	103	Density 6–18 per sq. mile.
	7	7	68.08	1,572	Density 18–45 per sq mile, over 10 per cent. foreign.
	9	1	67.52	1,189	Includes city of St. Louis.
Wisconsin....	1	6	68.42	2,937	
	6	1	67.04	1,391	Milwaukee, Racine and Kenosha counties. Most densely settled portion of the state.
Illinois.....	1	10	69.03	3,475	
	12	1	67.12	2,271	Includes city of Chicago.
	13	8	67.04	2,601	Springfield and adjacent counties; 40 per cent. foreign, mostly German.
Pennsylvania .	1	17	68.36	2,741	
	19	4	66.66	2,471	City of Philadelphia.
	20	2	66.58	1,206	City of Philadelphia.
	21	5	66.57	1,390	City of Philadelphia.
	22	10	66.46	1,070	Pottsville. Mostly German, Irish, etc. (miners).
	23	1	66.41	954	City of Philadelphia.
	24	3	66.32	696	City of Philadelphia.
New York....	1	31	68.40	3,875	
	27	10	66.31	1,705	Tarrytown. Density 90+ per sq. mile.
	28	9	65.99	347	New York city.
	29	21	65.97	464	Utica. Density 45–90 per sq. mile.
	30	15	65.88	474	Troy. Density 90+ per sq. mile.
	31	5	65.73	462	New York city.
	25	2	66.42	652	City of Brooklyn.
	26	3	66.34	1,137	City of Brooklyn.

The something, then, which Dr. Gould speaks of as causing greater stature in the western as compared with the eastern states, and which also causes the greater stature of Milwaukee, as com-

pared with Boston school children, is the lower degree of density in the population of the western states.

I am very glad to be able to quote so high an authority as Dr. Beddoe in regard to the influence of density upon the dimensions of man.

"The physical differences between country folkand townfolk are, perhaps, the most important ones developed in my tables. * * * Observe the gradual elevation of stature of the militia-men as we proceed from natives of Newcastle to those of Gateshead and the other suburbs, and then to those of the small towns and villages. * * * Next observe the Sheffield returns; the genuine natives of that town will be seen to fall considerably short of their fellow-workmen born in the surrounding towns and villages, and these again very much below the general population of Yorkshire and the other adjacent counties. At Haworth the population of weavers is stunted in comparison with Yorkshiremen in general, but even among them the natives of towns fall below the natives of villages, so that the degredation of stature would appear to be gradual and progressive. * * * The Lancashire and Norfolk returns are insufficient, the Nottinghamshire and Staffordshire fuller and more decided, but all point in the same direction. * * * Finally, the London return, which certainly does not err by depreciation, is much below the average of England."

ON THE RATE OF GROWTH OF THE BODY AND THE LOWER EXTREMITIES.

Plate XII shows curves for the body and the lower extremities of boys and girls from four to nineteen years. The body height was obtained by measuring from the seat on which the individual sat to the top of the head; and the length of the lower extremities by subtracting this height from the total height. How nearly this coincides with the length of the extremities measured to the perineum I am unable to say in the absence of any data. I have already made some measurements, but too few to be of value, and I prefer to give the curves and tables for what they are worth, and to defer their discussion until I shall have completed the

Pages 33-34 missing

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VII. The growth of the body and of the lower extremities takes place in such a way that the length of the body of the girl is less than that of the body of the boy until the tenth year, and thereafter greater until the sixteenth. From fifteen to eighteen the bodies of girls grow only two inches, and the bodies of boys over four. For the lower extremities, at nine years those of the girl are longer, at eleven shorter, and from twelve to fourteen again longer. At fourteen the lower extremities of the girls almost cease growing, while those of the boys increase by four inches between the ages of fourteen and nineteen.

TABLE No. 15.—*Showing Yearly and Half-Yearly Increments in Height and Weight for Milwaukee School Children.*

AGE AT LAST BIRTHDAY.	BOYS.						GIRLS.					
	Yearly increment.			Half-yearly increment, from May 1 to Nov. 1, two months being vacation.			Yearly increment.			Half-yearly increment from May 1 to Nov. 1, two months being vacation.		
	No. of Obs.	Height, inches.	Weight, pounds.	No. of Obs.	Height, inches.	Weight, pounds.	No. of Obs.	Height, inches.	Weight, pounds.	No. of Obs.	Height, inches.	Weight, pounds.
Fourteen	217	2.42	10.87	15	1.52	11.56	229	1.82	9.68	8	.52	7.41
Fifteen	109	2.45	13.29	17	1.26	8.64	132	1.09	8.23	20	.19	8.14
Sixteen	58	2.73	13.01	12	.83	5.50	109	.57	4.71	32	.11	5.23
Seventeen	31	1.53	8.29	10	1.54	5 35	54	.75	2.74	17	.17	4.82
Eighteen	19	.84	7 41	3	.24	7.30	45	.62	.64	12	.20	3.25
Nineteen	7	1.24	7.78	.....	.....	.....	20	.73	.....	3	.10	5.70

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TABLE NO. 16.—*Showing Rate of Growth of Gothenburg School Boys During Vacation and Term-time. (Wretlind.)*

AGE.	No. of Observations.	Increments.	
		Three months vacation. Height in inches.	Nine months school. Height in inches.
Seven	121	2.62	8.40
Eight	239	3.72	8.49
Nine	368	4.42	8.95
Ten	452	5.54	9.90
Eleven	499	6.01	12.78
Twelve	483	7.85	16.04
Thirteen	506	10.85	13.09
Fourteen	487	10.27	15.69
Fifteen	299	10.14	8.87
Sixteen	159	7.15	7.88
Seventeen	34	7.06	2.20
	3,647		

TABLE NO. 1.—*Showing Average Heights and Weights of Milwaukee School Boys.*

AVERAGE HEIGHTS (without shoes).

AGE AT LAST BIRTHDAY.	PARENTAGE.													
	Pure American.		American.		American and German.		German.		One or both English.		Irish.		Irrespective of Nationality.	
	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.
Four	4	39.85	8	40.35	4	39.55	33	40.88	.....	.....	2	39.25	64	39.98
Five	15	42.96	42	42.60	24	42.26	136	42.13	9	41.86	6	41.76	269	42.28
Six	26	43.75	71	43.53	46	43.80	292	44.20	19	43.92	15	44.80	546	44.08
Seven	35	46.18	83	46.13	49	46.54	313	46.96	30	46.06	24	46.76	593	46.69
Eight	39	48.32	77	48.32	43	48.35	308	48.01	27	48.52	26	47.75	575	48.05
Nine	38	50.64	81	50.72	39	49.95	293	49.86	31	49.83	28	50.21	544	50.00
Ten	36	52.37	63	52.10	34	52.30	306	51.78	28	51.89	25	51.72	543	51.85
Eleven	41	55.26	63	54.41	40	53.63	297	53.57	28	53.82	13	54.42	519	53.76
Twelve	32	56.35	49	55.69	25	54.72	246	54.93	23	55.91	13	55.09	337	54.98
Thirteen	42	57.79	56	57.55	26	57.94	180	57.19	17	58.59	9	56.44	347	57.47
Fourteen	30	59.62	42	59.76	14	60.88	103	59.15	17	60.37	10	59.61	212	59.89
Fifteen	26	62.66	32	62.84			42	61.96	9	63.81	6	63.18	107	62.34
Sixteen	17	66.70	22	65.80	8	63.84	21	63.66	6	67.46	1	63.50	59	65.07
Seventeen	7	68.01	10	67.50			8	66.25	5	66.10	1	66.30	32	66.60
Eighteen	4	70.05	6	69.08	.....	.....	7	65.45	.....	.....	2	68.40	19	67.44
Nineteen	3	69.10	3	69.10	.....	.....	3	68.20	.....	.....	.....	.....	7	68.68
Totals	395	.....	708	.....	352	.....	2,582	.....	249	.....	181	.....	4,773	.....

TABLE No. 2.—*Showing Average Heights and Weights of Milwaukee School Boys.*

AVERAGE SITTING HEIGHTS.

AGE AT LAST BIRTHDAY.	PARENTAGE.													
	Pure American.		American.		American and German.		German.		One or both English.		Irish.		Irrespective of Nationality.	
	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.
Four	4	22.47	8	22.71	4	22.32	33	22.48	2	22.70	2	21.95	65	22.65
Five	15	23.87	42	23.75	24	23.67	135	23.53	8	23.36	6	23.28	264	23.53
Six	26	24.51	68	24.48	46	24.32	293	24.13	17	24.62	15	24.67	557	24.39
Seven	33	25.35	80	25.44	43	25.35	345	25.29	30	25.25	24	25.44	599	25.33
Eight	40	26.49	76	26.38	44	26.22	314	26.16	27	26.35	26	26.07	581	26.17
Nine	39	27.31	80	27.27	38	27.11	283	26.93	28	27.03	29	27.24	535	27.53
Ten	37	28.06	62	27.92	36	27.93	323	27.22	30	27.89	12	27.79	544	27.71
Eleven	39	29.18	61	28.86	42	28.36	299	28.03	27	28.44	13	28.44	522	28.55
Twelve	33	29.79	49	29.49	27	28.73	249	28.96	23	28.96	14	29.21	436	29.01
Thirteen	41	30.11	54	30.05	26	30.16	180	29.83	16	30.48	9	29.50	342	29.97
Fourteen	30	31.20	42	31.17	14	31.71	99	30.86	16	31.54	10	31.13	210	31.13
Fifteen	26	32.81	33	32.88	3	31.80	42	32.10	9	34.46	5	33.32	108	32.53
Sixteen	18	34.77	22	34.40	2	32.55	23	33.25	7	35.27	5	34.46	59	34.00
Seventeen	7	35.41	9	35.08	2	35.25	8	34.70	5	35.50	3	3,536	32	34.78
Eighteen	6	35.03	6	35.03	.....	.....	7	34.99	.....	.....	.....		.....	35.37
Nineteen	3	35.73	3	35.73	.....	.....	3	36.27	.....	.....	.....	.....	26	
Totals	397	.....	695	.....	351	.....	2,606	.....	245	.....	173	.....	4,887	.....

TABLE NO. 3.—*Showing Average Heights and Weights of Milwaukee School Boys.*

AVERAGE WEIGHTS (in ordinary dress).

AGE AT LAST BIRTHDAY.	PARENTAGE.													
	Pure American.		American.		American and German.		German.		One or both English.		Irish.		Irrespective of Nationality.	
	No. of Obs.	Pounds.	No. of Obs.	Pounds.	No. of Obs.	Pounds.	No. of Obs.	Pounds	No. of Obs.	Pounds.	No. of Obs.	Pounds.	No. of Obs.	Pounds
Four	4	38.31	8	39.22	3	39.75	34	38.64	2	38.25	2	37.75	66	38.84
Five	16	42.30	44	41.69	23	41.08	162	41.55	8	40.97	7	40.86	296	41.09
Six	25	45.20	70	44.88	46	44.57	328	45.24	17	42.44	15	46.15	595	44.81
Seven	34	48.13	81	48.73	46	49.59	344	49.17	29	48 46	24	49.39	646	49.10
Eight	41	54.51	80	54.79	45	54.67	342	53.98	27	53.97	26	53.62	585	53.81
Nine	40	60.33	84	60.93	41	59.15	316	58.80	31	61.05	29	59.36	587	59.46
Ten	38	65.42	66	65.14	35	66.36	340	64 84	29	64.53	12	67.69	558	65.35
Eleven	37	74.28	93	72.29	43	70.53	313	70.81	28	72.29	14	71.50	543	70.92
Twelve	33	80.53	51	77.08	26	73.54	251	75.72	23	76.68	15	78.85	439	76.08
Thirteen	43	85.56	53	84.74	25	89 23	184	84.36	17	86.82	10	79.43	351	84.89
Fourteen	29	93.90	39	95.64	16	100 25	105	94.88	15	92.98	10	94.73	217	95.76
Fifteen	28	106.26	34	109.43	3	97.83	41	109.10	8	121.63	5	110 40	109	109.05
Sixteen	16	124.69	21	122.05	2	107.75	23	118 88	7	1:6.21	1	113.75	58	122.06
Seventeen	7	129.71	10	127.53	1	136.75	7	132.25	4	139.63	1	124.00	31	130.35
Eighteen	4	127.25	6	130.79	1	115.50	7	136.46	.....	.....	2	151.25	19	137.76
Nineteen	3	142.50	3	142.50	.....	.....	3	151.58	.....	.....	.....	.....	7	145.54
Totals	398	.....	743	.....	356	.....	2,800	.....	245	.....	173	.....	5,107	.....

TABLE NO. 4.— *Showing Average Heights and Weights of Milwaukee School Girls.*

AVERAGE HEIGHTS (without shoes).

AGE AT LAST BIRTHDAY.	PARENTAGE.													
	Pure American.		American.		American and German.		German.		One or both English.		Irish.		Irrespective of Nationality.	
	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.
Four	3	39.90	7	38.70	4	40.28	31	38.70	3	38.67	.....	.....	71	39.65
Five	16	41.72	33	40.66	17	42.09	174	40.54	11	42.55	10	41.78	231	41.72
Six	11	43.51	43	43.45	44	44.03	307	43.42	17	44.72	16	43.99	508	43.78
Seven	29	45.76	65	45.87	37	45.29	302	45.86	31	46.04	23	46.53	549	45.93
Eight	39	48.36	76	47.40	37	48.36	323	47.39	24	47.25	20	47.06	553	47.59
Nine	40	49.87	78	49.81	46	50.24	310	49.76	31	50.37	30	50.86	578	49.81
Ten	38	52.08	56	51.79	34	51.91	286	51.84	20	52.65	30	52.13	526	51.89
Eleven	50	55.15	65	54.40	33	53.98	270	53.46	25	54.82	24	54.26	507	53.80
Twelve	44	57.08	72	57.07	25	56.82	242	55.83	33	56.99	21	56.52	469	56.47
Thirteen	47	59.46	68	59.18	17	58.64	146	58.22	31	59.50	24	58.99	327	58.68
Fourteen	40	60.92	53	61.03	11	60.65	78	59.95	24	60.71	21	60.63	219	60.50
Fifteen	33	62.01	39	61.81	.....	.....	39	61.15	14	61.54	17	61.81	128	61.59
Sixteen	25	62.10	37	61.99	.....	.....	23	61.97	8	62.07	13	62.86	108	62.16
Seventeen	17	62.65	21	62.58	.....	.....	13	62.75	5	62.76	7	64.54	52	62.91
Eighteen	20	62.66	21	62.90	.....	.....	.....	.....	6	63.08	.....	.....	45	62.53
Nineteen	20	63.25	21	63.11	.....	.....	.....	.....	4	62.33	.....	.....	20	63.26
Totals	472	.....	755	.....	305	.....	2,544	.....	287	.....	256	.....	4,891	.....

TABLE No. 5.—*Showing Average Weights and Heights of Milwaukee School Girls.*

AVERAGE SITTING HEIGHTS.

AGE AT LAST BIRTHDAY.	PARENTAGE.													
	Pure American.		American.		American and German.		German.		One or both English.		Irish.		Irrespective of Nationality.	
	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No. of Obs.	Inches.	No of Obs.	Inches.	No. of Obs.	Inches	No. of Obs.	Inches.
Four	3	22.70	7	22 23	4	22.37	30	22.14	3	22.37	4	21.20	71	22.18
Five	16	23 29	34	23.33	18	23.24	122	23.18	12	23.66	10	23.20	230	23.21
Six	11	24 29	44	24.28	48	24.43	296	24 27	17	24.80	16	24.49	502	24.29
Seven	29	25.30	68	25.24	34	24.86	301	25.15	31	25.14	24	25.66	549	25.21
Eight	38	26.52	77	26.29	37	26.31	320	25 80	25	25.61	20	25.64	544	25.87
Nine	40	26 74	77	26.81	48	27.09	313	26 74	31	26.99	29	27.20	576	26.81
Ten	38	27 90	57	27.75	31	27.58	284	27.64	30	28.06	31	28.03	514	27.71
Eleven	50	29.40	65	29.10	30	28.46	270	28.71	25	29.13	24	28.78	494	28.62
Twelve	43	30.15	70	30.36	25	30,08	244	29.40	33	29.94	20	29 53	466	29 59
Thirteen	47	31.44	67	31.31	19	31.01	145	30.66	30	31.70	24	31.48	329	30.99
Fourteen	40	32.19	52	32.18	12	32.52	78	31.74	22	32.13	22	32.28	218	31.83
Fifteen	33	33 60	39	33.02	3	33.47	38	32.39	14	33.08	17	33.08	130	32.88
Sixteen	26	33.17	36	33.18	.....	.....	23	33.20	8	33.56	13	33.73	106	33.35
Seventeen	17	33.70	22	33.78	.....	.....	13	33.72	5	34.00	8	34.55	54	33.89
Eighteen	19	33 81	23	33.73	.....	.....	4	33.15	6	33.88	4	33.35	45	33.67
Nineteen	2	33.88	11	34.19	.....	.....	3	33.33	4	33.43	.....	.....	20	33.88
Totals	452	.....	749	.....	312	.....	2,484	.....	286	.....	266	.....	4,848	.....

TABLE NO. 6.—*Showing Average Heights and Weights of Milwaukee School Girls.*

AVERAGE WEIGHTS (in ordinary dress).

AGE AT LAST BIRTHDAY.	PARENTAGE.													
	Pure American.		American.		American and German.		German.		One or both English.		Irish.		Irrespective of Nationality.	
	No. of Obs.	Pounds.	No. of Obs.	Pounds.	No. of Obs.	Pounds.	No. of Obs.	Pounds	No. of Obs	Pounds.	No. of Obs	Pounds.	No. of Obs.	Pounds
Four	3	37.67	8	36.38	4	38.00	38	36.49	3	36.75	4	33.56	80	36.29
Five	15	39.55	34	39.44	19	39.19	141	40.50	12	40.48	11	39.16	253	40.03
Six	11	42.45	44	42.50	46	43.92	308	43.23	17	44.99	17	42.88	525	43.12
Seven	38	46.74	69	46.53	41	46.51	326	46.94	33	47.05	23	48.29	591	46.97
Eight	39	52.81	79	51.80	44	52.61	322	50.83	28	49.84	21	49.69	595	50.87
Nine	41	56.35	82	55.67	49	59.00	335	55.52	31	56.67	31	59.94	621	56.44
Ten	40	61.70	61	61.77	37	61.98	312	62.82	22	67.68	31	63.13	554	62.45
Eleven	59	71.73	65	70.83	32	69.57	281	68.19	27	71.28	24	69.02	514	68.84
Twelve	43	82.98	72	82.17	28	80.24	240	75.26	33	79.99	22	78.68	478	77.82
Thirteen	47	91.62	66	89.64	21	88.14	145	86.64	31	92.08	25	88.56	336	87.96
Fourteen	46	96.56	58	98.84	11	99.27	75	95.30	24	96.58	22	96.32	229	97.64
Fifteen	33	105.99	40	104.71	3	128.58	40	105.66	15	103.60	17	105.09	132	105.87
Sixteen	26	107.21	37	106.74	2	102.25	23	112.54	8	104.19	13	119.96	109	110.58
Seventeen	17	115.06	22	114.60	.....	.....	13	120.40	5	111.95	8	114.47	64	113.32
Eighteen	20	116.74	23	115.68	.....	.....	4	107.88	6	117.00	4	114.56	45	112.48
Nineteen	9	121.61	11	119.93	.....	.....	3	109.33	4	123.19	.....	.....	20	117.30
Totals	478	.....	771	.....	334	.....	2,606	.....	299	.....	273	.....	5,130	.....

TABLE NO. 7.—*Showing Annual Growth and Ratio of Weight to Height of Milwaukee School Children.*

BOYS.

AGE.	PARENTAGE.																					
	Pure American.			American.			American and German.			German.			One or both English.			Irish.			Irrespective of Nationality.		
	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.
	Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.	
Four	.....	.....	.963	.....	.....	.971	.....	.....	1.005	.....	.....	.945	...	.....	.....	.....	.....	.961	.....	.....	.971
Five	3.11	3.99	.984	2.25	2.47	.978	2.71	1.33	.977	1.25	2.91	.986	..	2.72	.978	2.51	3.11	.978	2.30	2.25	.971
Six	.79	2.90	1.033	.93	3.19	1.031	1.54	3.49	1.017	2.07	3.69	1.023	2.06	1.47	.966	3.04	5.29	1.030	1.80	3.72	1.076
Seven	2.43	2.93	1.422	2.60	3.85	1.056	2.74	5.02	1.065	1.86	3.93	1.067	2.14	6.02	1.051	1.96	3.24	1.056	2.01	4.29	1.065
Eight	2.14	6.38	1.128	1.19	6.06	1.133	1.81	5.08	1.130	1.95	4.81	1.124	2.46	5.51	1.112	.99	4.23	1.122	1.96	4.71	1.119
Nine	2.32	5.82	1.191	2.40	6.14	1.201	1.60	4.48	1.184	1.85	4.82	1.179	1.31	7.08	1.225	2.46	5.74	1.182	1.18	5.65	1.189
Ten	1.73	5.09	1.249	1.38	4.21	1.270	2.35	7.21	1.268	1.92	6.04	1.252	2.06	3.48	1.243	1.51	8.33	1.308	1.85	5.89	1.260
Eleven	2.89	8.86	1.344	2.31	7.15	1.328	1.33	4.17	1.315	1.89	5.97	1.321	1.93	7.76	1.343	2.70	3.81	1.313	1.91	5.57	1.319
Twelve	1.09	6.25	1.429	1.28	4.79	1.384	1.09	3.01	1.343	1.36	4.91	1.379	2.09	4.39	1.371	.67	7.35	1.431	1.22	5.16	1.383
Thirteen	1.44	5.03	1.480	1.86	7.66	1.472	3.22	5.69	1.540	2.26	8.64	1.475	2.68	10.14	1.481	1.35	.58	1.407	2.49	8.81	1.477
Fourteen	1.83	8.34	1.500	2.21	1.09	1.600	2.94	11.02	1.652	1.96	10.52	1.694	1.78	6.16	1.540	3.17	15.30	1.589	2.42	10.87	1.598
Fifteen	3.04	1.236	1.695	3.08	1.379	1.742			....	2.81	14.22	1.762	3.44	28.65	1.906	3.57	15.67	1.747	2.45	13.29	1.749
Sixteen	4.04	1.843	1.854	2.96	1.262	1.854	2.96		.....	1.70	9.78	1.867	3.65	14.58	2.019	.32	3.35	1.791	2.73	13.01	1.875
Seventeen	1.31	5.02	1.907	1.70	5.48	1.880		8.50	....	2.59	13.37	1.996	....	3.42	2.121	2.80	10.25	1.870	1.54	8.29	1.957
Eighteen	1.65	4.07	1.816	1.58	3.26	1.893	.....		....	.02	4.21	2.084	....	.....	....	2.10	27.25	2.21	.84	7.41	2.042
Nineteen			2.062	.02	1.171	2.062	.....		.....		15.12	2.222	....	.....	....	..	.....	.....	1.24	7.78	2.119

TABLE No. 8.—*Showing Annual Growth and Ratio of Weight to Height of Milwaukee School Children.*

GIRLS.

AGE.	PARENTAGE.																							
	Pure American.			American.			American and German.			German.			One or both English.			Irish.			Irrespective of Nationality.					
	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.	Annual increase.		Pounds per inch.			
	Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.		Height, inches.	Weight, pounds.				
Four	..	.....	.944	.....	.....	.940	...	.....	.943	.....	.....	.942	...	.....	.950	..	.....	.....	.....	.....	.915			
Five	1.82	2.88	.947	2.96	3.06	.969	1.81	1.19	.931	1.84	4.01	.999	4.08	3.73	.946	2.21	5.60	.937	2.07	3.74	.959			
Six	1.79	2.90	.975	2.79	3.06	.978	1.94	4.73	.997	2.88	2.73	.995	1.97	4.51	1.006	2.54	3.72	.974	2 06	3.09	.987			
Seven	2.25	4.29	1.021	2.42	4.03	1.014	1.26	2.59	1.026	2.44	3.71	1.023	1.32	2.06	1.021	.53	5.51	1.039	2 15	3.85	1.026			
Eight	2.60	6.07	1.091	1.53	5.27	1.092	3.05	6.10	1.087	1.53	3.89	1.072	1.21	2 76	1.054	3.80	1.30	1.055	1.66	3.90	1.068			
Nine	1.51	3.54	1.129	2.41	3.87	1 117	1.98	6 39	1.134	2.37	4.69	1.115	3.12	6 86	1.125	1.27	10.25	1.178	2.22	5.57	1.133			
Ten	2.21	5.35	1.184	1.98	6.10	1.192	1.67	2 98	1.193	2.08	7.30	1.211	2.28	11.01	1.285	2.13	3.19	1.211	2.08	6.01	1.203			
Eleven	3 07	0.03	1 300	2.61	9.06	1 302	2.07	7.59	1.288	1 62	5.37	1.273	2.17	3 60	1.300	2.26	5.89	1.273	1.94	6.39	1.279			
Twelve	1.93	11.25	1.453	2.67	11.34	1.439	2.84	10 67	1.472	2.37	7.17	1.354	2.17	8.71	1.403	2.47	9 66	1.392	2.67	8.98	1.378			
Thirteen	2.38	8.64	1.540	2.11	7.47	1.514	1.82	7.90	1.503	2.39	11.28	1.48-	2.51	12.09	1.547	1.64	9 88	1.501	2 21	10.14	1.49.			
Fourteen	1.46	4.44	1.576	1.85	9.20	1.619	2.01	11.13	1.636	1.73	8.66	1.590	1.21	4.50	1.590	1.18	7.76	1.593	1.82	9.68	1.613			
Fifteen	1.19	8.84	1.707	.78	5.87	1.694	....	29.31	.....	1.20	10.36	1.727	.83	7.02	1.683	1.05	8.77	1.700	1.09	8.23	1.718			
Sixteen	.09	1.31	1.726	.18	2.03	1.721	...	.....	.....	.82	6.88	1.816	.53	.59	1.678	1.68	14 87	1.919	.57	4.71	1.778			
Seventeen	.55	7.85	1.836	.59	7.86	1.831	....	.....	.....	.78	)	1.918	.69	7.76	1.783	...	...	1.773	.75	2.74	1.801			
Eighteen	.01	1.68	1.863	.32	1.08	1.839	....	.....	.....	...	3.75	.....	.32	5.05	1.854	...	.....	.....	.62	) .64	1.798			
Nineteen	.59	4.87	1.922	.21	4.25	1.900	...	.....	.....	...	)	.....	.....	.....	1.815	....	.....	.....	.73	)	1.854			

APPENDIX.

Since writing this report I have received through the courtesy of Dr. L. B. Tuckerman, of Cleveland, Ohio, the dates of first menstruation of eighty-two girls, as follows:

Between 10 and 11 years of age	2
Between 11 and 12 years of age	2
Between 12 and 13 years of age	6
Between 13 and 14 years of age	22
Between 14 and 15 years of age	25
Between 15 and 16 years of age	20
Between 16 and 17 years of age	4
Between 17 and 18 years of age	1
Total	82